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ABSTRACT

This report summarizes the procedures and outcomes of a study undertaken to provide educational decision-makers with an array of cost effective strategies for assessing the individual competencies of school library media specialists. It provides a literature review of the field and discussions of the classification and definition of assessment methods, measures of their effectiveness and efficiency, a cost effectiveness model, general competency assessment by faculty, the dissemination of project results, and the research agenda. Appendices detail the competencies for media specialists, competency evaluation techniques, interview protocol for determination of faculty assessment activities, and interview protocol for estimates of faculty assessment costs. (FM)

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FINAL REPORT

Competency-Based Assessment Project

Syracuse University

Syracuse, New York

September 30, 1979

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COMPETENCY ASSESSMENT STRATEGIES

This is a summary of the procedures and outcomes of a study undertaken by Drs. Daniel and Ely, entitled "Developing Alternative Strategies for Evaluating Competencies of Library/Media Personnel in Competency-Based Programs".

The study was prompted by a realization that although competency-based programs for school library media specialists are increasingly being adopted by state agencies as a basis for certification and by educational institutions as a procedure for educating media professionals, the effort in developing these programs has been heavily (indeed, almost exclusively) weighted towards the generation of competency statements with little attention being paid to the perhaps more difficult problem of competence assessment. The proposal for this study quoted the AASL Certification Committee's observation that

> "...the art of competence assessment is woefully behind... Our lack of experience in the task of performance assessment, the identification of data gathering techniques -- including what data will be required and under what conditions, the validation of assessment criteria, the need for competent evaluators to implement the assessment process, the cost of candidate assessment in terms of time and dollars, and reaching consensus on the levels of certification all pose serious concerns for the profession." (Candidate Assessment Process for Professional Media Personnel, 1977)

To some extent, the general lack of attention to evaluation is an artifact of the sequential process of development. Competency-based education for school media specialists is still a new area. Competencies must first be identified and agreed upon before there

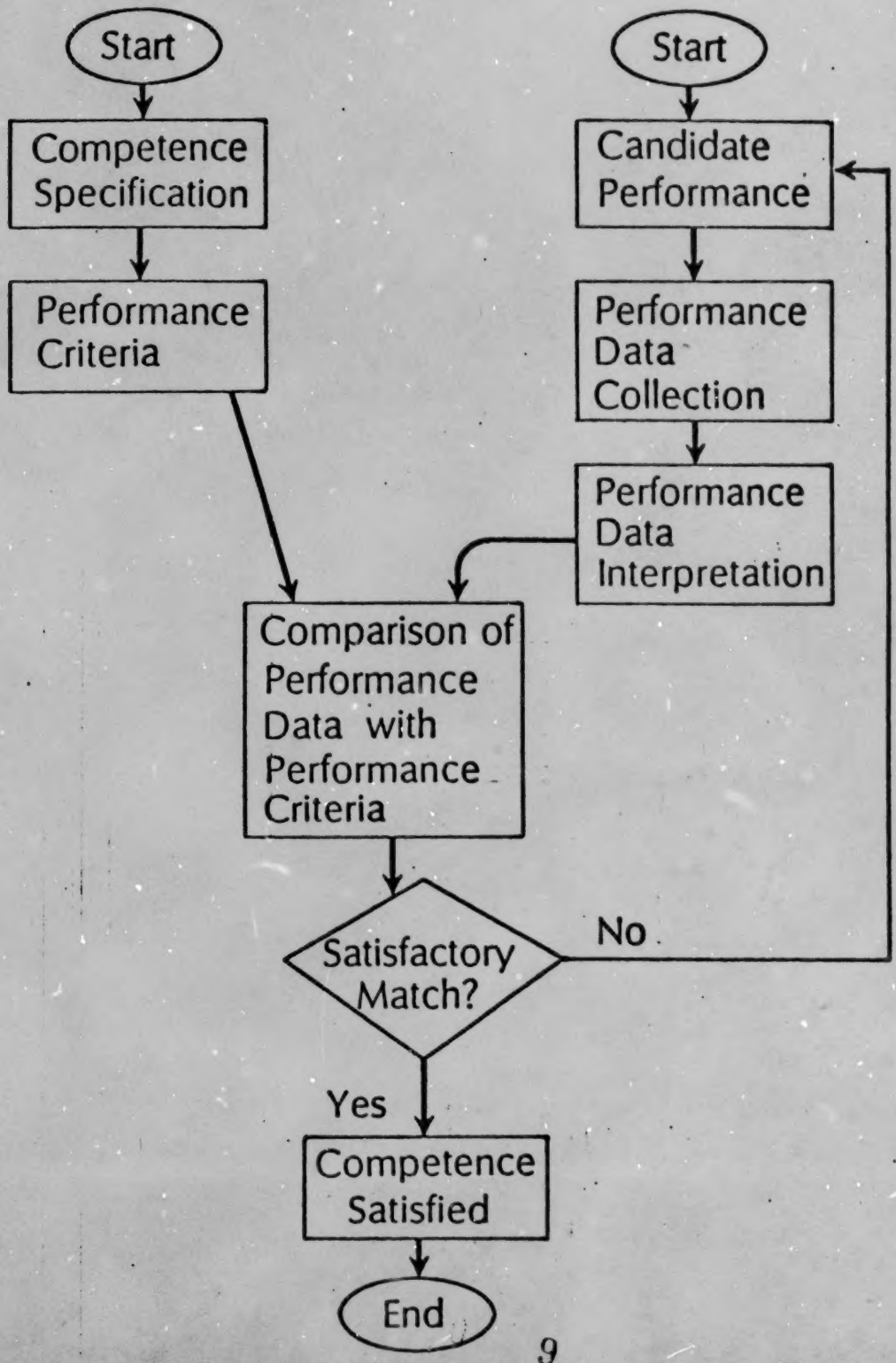
can be any concern with whether or not a person has achieved a given competency or set of competencies. The AASL Assessment Process Model makes the sequential process clear by beginning in matter of fact fashion with "Competence Specification." (See Fig. 1 - Competency Assessment Model)

Certain it is that for the authors there was a natural and logical sequence of events leading to our concern with assessment. During 1977 we created and carried out a plan for the development of an integrated competency-based program for the preparation of media professionals in response to a mandate from the New York State Education Department. A description of this process has been provided in the publication, A Process for Developing a Competency-Based Education Program for Media Professionals published by ERIC in 1978.[1] In this document, the techniques for identifying competencies and generating consensual agreement on their stated form and on their level of specificity are clearly and carefully delineated.

The realization that the major work lay ahead in wrestling with assessment methodologies became clear as a result of that project.

A preliminary survey of the literature on competency-based education outside the media field showed that the lack of clear guidelines for developing assessment strategies was also true of all other areas where competency-based education was being implemented. This led to the development of a proposal -

Fig. 1. ASSESSMENT PROCESS MODEL



> to develop an assessment model that will provide a high degree of flexibility for students in the most parsimonious manner possible in order to best use the limited resources of the school. 2

A series of specific objectives were put forward and a plan to accomplish their achievement was proposed. In July of 1978 this project was funded by the U.S. Office of Education through the Bureau of Libraries and Learning Resources, and the project begun.

The methodology for this project involved working back and forth between literature review and theoretical model development and the collection of empirical data testing various aspects of the model with formal and informal interviews of various experts to critique the developing model. A cost-effectiveness approach was selected as the most appropriate method. The primary target audience for the study was the education community. The ultimate goal was to be able to provide educational decision-makers with an array of assessment strategies for each individual competency with costs (both monetary and other) and effectiveness measures associated with each strategy so that the educational decision-maker could make an informed choice. The intent was to demonstrate trade-offs clearly.

To a considerable degree, we believe we have succeeded in attaining that goal. Specifically, the outcomes of the study are as follows:

> 1) A clearer understanding of what Competency-Based Education is and should be as applied to graduate programs and specifically school media programs.

2) A comprehensive state-of-the-art review on what is happening in competency-based education that has relevance for CB programs in media education with particular emphasis on evaluation and assessment. This goes beyond a literature review to identify what is happening, where it is taking place, and who are the key people associated with it.

3) A clarification of assessment strategies through classification and formal definitions. This includes the initiation of a data bank of nearly four hundred specific assessment techniques.

4) The development of a set of techniques for measuring the efficiency of each assessment strategy through primary and secondary cost analysis.

5) A less completely developed set of techniques for measuring the effectiveness of each assessment strategy through primary and secondary effectiveness analysis.

6) The development and preliminary testing of a model for cost effectiveness analysis of assessment strategies for competency-based education. We consider this the major achievement of the study.

7) A methodology for determining which competencies are assessed by faculty and in what manner within a given school resulting in a competency by assessment matrix useful in flexible and informed advisement for students.

8) A comprehensive evaluation of the competency-based program for media specialists at Syracuse University with clear directions for improvement.

9) Dissemination of the results of this project through formal presentations, articles, and reports.

10) A research agenda for the future as a result of clear articulation of issues with a systematic program of research to address these issues.

Each of these outcomes will be discussed in turn in the report which follows.

Competency-Based Education for School Library Media Specialists

Competency-based education originated as an improvement of standard teacher training programs. It has spread to other professional education programs, such as nursing, social work, pharmacology, and library/media service. CBE as a curriculum innovation attempts to develop skills and attitudes which are essential for performing a set of specified tasks which have been identified as necessary for success in a given profession. Three basic assumptions underlie CBE[3]. First, for most jobs, it is possible to identify a finite group of observable behaviors (competencies) which are necessary and sufficient for competent professional performance. Second, appropriate performance measures for each competency or group of competencies can be designed and validated. Third, performance assessment should take place in settings as like actual professional settings as possible.

In part the emergence and wide-spread acceptance of CBE derives from a perceived overbalancing in education towards the purely theoretical. Education has been noted for the continuing tension between theory and practice, between thinking and doing. A theoretical education deals in abstraction. The theoretician sees knowledge as an end, valuable for its own sake. A theoretical approach tends to be divergent entertaining many possibilities and ideas. The nature of graduate education leads educators to value a theoretical approach more highly than a practical one which deals in concretes, sees knowledge as a means to an end, and tends to be convergent focusing on improving

proficiency in specified performances.

Obviously both approaches are important if one is educating a professional who must be able to perform adequately on the job but who also must hold a larger view of the job and its environment and who must be prepared to adapt to unforeseen future changes. The CBE approach appears to be a response to this continuing theory-practice conflict that will pull professional education closer to the "real world" of practice. The danger, of course, and the concern that many educators have expressed is the fear that graduate professional education may become overbalanced in the practical direction and that theory will be abandoned. Many of the developments in competency-based education in graduate schools can be traced to this concern.

There are basic differences between CBE as practiced in graduate education as opposed to undergraduate primary and secondary education. Most of these differences are a result of the need to blend the convergent method of CBE with the divergent environment of graduate education. One difference is the more general level of objective specificity. A broad concept of competency is usually adopted for professional education rather than a narrow definition that spells out tasks in behavioral terms. The broad concept helps to focus on specific responsibilities which professionals will be expected to perform on the job. The narrow definition would not leave enough room for other learnings which are also important but difficult to specify.

Another difference is that the model of mastery learning is not

assumed at the graduate level. Mastery learning asserts that the majority of students can learn the contents of a given curriculum if they are provided enough time to master the material at their own pace. Most professional schools adopting CBE do not accept the mastery model for the following reasons. First, there has already been a rigorous screening process designed to guarantee that those admitted to graduate programs are capable students and can accomplish the work presented in the curriculum. Second, because competition for admission can be high, those admitted should not be allowed an indefinite period to master material. Finally, professionals being produced by graduate schools are often placed in positions of responsibility immediately. Thus it seems neither reasonable from a school's perspective nor responsible from a broader societal view to allow students an extended period to reach mastery when repeated failure may indicate a lack of ability or of disposition for professional practice. As a result, CBE in graduate school is less an attempt to deal fairly with each student in allowing that student to learn at his/her own pace, than an attempt to certify that each graduate is capable of delivering professional service in the field upon successful completion of a course of study.

For similar reasons (especially for the social cost involved) Graduate CBE usually does not include remediation opportunities nor place much emphasis on providing multiple learning approaches.

Finally, CBE at the graduate level is generally more idealistic and futuristic. The competencies of graduate training are designed

to be both skills necessary at present in the field, documented through field practice, in addition to competencies which ought to be used, but because of a lack of training or opportunity are not being demonstrated in current practice. Generally then, one can say that competencies in graduate school are required more to protect the clients of graduate professionals than to assure students of personal well-being or fulfillment.

These conclusions about the evolving nature of CBE in graduate programs have been reached in part by an extensive study of the writings on CBE and through interviews with those working in the area. The next section describes the current scene.

The State of the Art of Competency Assessment

To ascertain current happenings in CBE with particular reference to evaluation and assessment, we instituted a series of searches, both manual and computerized, of published literature sources and ERIC documents. Three experts who served throughout the project as a National Advisory Panel were:

James Liesener, Professor and Coordinator of School Media Programs at the College of Library and Information Services, University of Maryland

James Maxwell, Director of the Instructional Media Center, Lane Educational Service District, Eugene, Oregon.

Lore Scurrah, Chief of the Bureau of School Libraries, New York State Education Department, Albany, New York.

The Panel constituted a valuable "invisible college" providing

information about happenings not yet reported in the literature and leading us to an informal network of people engaged in one or more aspects of work on competency-based assessment.

The results of this effort have been reported in a comprehensive paper, "Competency Based Assessment: An Update", submitted to the Office of Education as part of the second quarterly report for this project. This paper is currently being revised and updated for publication. Some highlights from that report follow.

Major work on CBE assessment for school library media programs goes on apace. Eleven states now have competency-based certification programs and another nineteen are in various stages of development. Of these, Maryland (through the graduate library school), Utah (through the State Education Department in conjunction with several teacher training institutions) and New York (through the program at Syracuse University) have provided printed material of particular relevance to this project. Both Maryland and Syracuse University work within existing curricula in large library schools which are only fractionally concerned with the school media program. Thus both tend to take an incremental approach -- identifying opportunities where students can attain competencies through general school courses, developing new courses, modifying older ones, and, in general, working with Faculty styles of assessment. The State Education Department at Utah opted to support the development of a comprehensive pencil and paper testing program that established indicators for each competency and objective

questions to assess student performance on the indicators.

Chisholm and Ely's book remains the major work in the field.[4] The American Association of School Librarians on the candidate assessment process for library media specialists[5] must also be considered a seminal work. The AASL group attempted to go beyond pencil and paper tests by providing examples of situations using jury panels of experts and actual performance activities.

A number of programs outside the media field where advances in assessment techniques were achieved were identified. A brief mention of more notable follows. There were two approaches to assessing teacher competency, one in Oregon critiqued by Schalock,[6] the other in Georgia described by Okey et al.[7] Good reliability and validity studies accompanied the latter effort.[8] The undergraduate medical curriculum of the Southern Illinois University School of Medicine has been competency-based since its inception in 1973. A good summary of procedures with attention to the design of a competency maintenance system and comment on eight assessment procedures is provided by Williams.[9] The competency-based pharmacology program at the University of Minnesota employs an assessment center approach to competency measurement.[10] For school social workers the University of Washington, Seattle features a consortium-directed competency-based program featuring a Candidate Review Board that uses a peer review and advocacy process.[11] Ellis and Bryant describe some of the problems of evidence gathering and weighing inherent in this approach.[12] Alverno College,

a small women's liberal arts college in Milwaukee, Wisconsin, awards its degrees on the basis of a CBE program using an assessment center concept.[13] The military have also made significant advances in assessment of competency through validation studies, behavior sampling, highly sophisticated simulation laboratories, and development of criterion-referenced/performance-based measures.[14] Especially interesting approaches were those reported at the 1979 AECT Conference by Worth Scanland of the Naval Education and Training Command,[15] Wayne Waag of the Air Force Human Resources Laboratory,[16] Robert Wilshire of the Army Signal Center,[17] and Marjorie Kupper from the U.S. Army Engineer School in Fort Belvoir, Virginia.[18]

General research on evaluation also provides some useful insights. DeProspo and Liesener describe current evaluation models in a concise but thorough review for media program evaluation.[19] Hall and Jones, in a general presentation of the theory and state-of-the-art of CBE raise and discuss twelve provocative questions affecting competency assessment.[20] Houston and Howsam review CBE with emphasis on teacher education,[21] while Hodgkinson, et al. focus on assessment in the higher education area.[22] Harris and Kelly elaborate the higher education assessment work more fully.[23] Finally, two new books published within the last year demonstrate the substantial growth in the field. On Competence brings together review articles by experts on major aspects of CBE.[24] Of particular interest is the fine state-of-the-art review on assessment by King.[25]

In the second recent book, Gilbert proposes a behavior engineering model.[26] He suggests that behavior has three aspects:

Information coming to the person telling him/her what to do (S^D - the discriminative stimulus)
The person responding in some way (R - response)
The action of responding and the stimulus being reinforced (S^R - the reinforcing stimulus)

Performance also has two aspects: a person with a repetoire for behavior (P) and a supporting environment (E). Gilbert develops a simple 3x2 matrix as a way of examining competent performance with its antecedents more analytically. He suggests a new measure - the PIP. A PIP (Potential for Improving Performance) is the ratio of exemplary performance to typical performance. Through its use he identifies points where the opportunity exists to make the biggest positive change. Gilbert further specifies ways of measuring any performance through selected measures of quality (defined as accuracy, class, and/or novelty), quantity (rate, timeliness and/or volume) and cost (labor, material, and/or management). Gilbert's approach is an interesting extension of Skinnerian behavior modification and one that we would like to apply in future study of the field work component of CBE.

From the aforementioned and a number of other sources, we were able to identify particular problems and approaches in the assessment of competency. In the first place, whereas before we began our study we spoke almost synonomously of evaluation and measurement, we realized that there is a growing consensus that evaluation is the broader term relating to programs and products more than to individuals, whereas assessment refers to the specific evaluation of learning outcomes.[27]

Rountree's delightfully literate discussion provides additional support for this distinction.[28]

Major problems continue with respect to precise definition of measures, determination of a "significant" sample of behaviors when collecting data on the measures, and, perhaps the biggest problem, of validation of the measures.[29] Assessment centers are being established in many areas particularly for management development programs. A good overview on the potential for the assessment center approach is Applying the Assessment Center Method.[30]

A number of studies used some variation of a matrix as a systematic organizing tool because of the array of evaluation strategies, learning domain categories, presentation formats, etc. Hodgkinson says that CBE needs "instruments capable of much finer gradations, instruments capable of providing formative diagnostic advice, and instruments capable of telling us if the student is "real world" competent ...".[31] They see the matrix as a device which facilitates triangulation (that is, different measures coming from different sources but all indicating the same result) greatly increasing the reliability of judgments based on the measure. Rogers uses a matrix to relate testing strategies in the field of library science and media.[32] Of course, one of the earliest to use a matrix strategy to present massive amounts of inter-related information in an orderly fashion was JIIS.[33] The matrix is a device that we have adopted as useful for this study.

From this comprehensive and still on-going state-of-the-art

review as well as from our process of empirical data collection and sorting, we have developed a classification of assessment strategies which will be described in the next section.

Classification and Definitions of Assessment Strategies

Early in the project we began to collect specific techniques for assessing competencies in order to establish a data bank of assessment procedures for each of the seventy competencies currently in use for the Syracuse program (See Appendix A) plus variations and additions from other CB programs throughout the country. To do this we first had to devise a standard collection instrument. A list of the categories used to collect the information is shown in Figure 2.

Our original expectation was that a comprehensive array of techniques would be relatively easily collectible. We planned to computerize the information for subsequent easy manipulation and retrieval and then to move quickly to testing the cost and effectiveness of alternative techniques. Although we did collect nearly four hundred specific techniques and initiated the data bank, it would require many more techniques from a larger number of sources for our original approach to be a fruitful one. (Examples of assessment techniques for one competency from each of the seven major functional areas are included as Appendix B).

We used this data bank to test and refine our category scheme for assessment strategies. From this approach we identified eight strategies

COMPETENCY STATEMENT:

COMPETENCY NUMBER:

EXPLICATION:

COMPETENCY AREA:

LEVEL OF ASSESSMENT:

ASSESSMENT STRATEGY:

CONDITIONS:

CRITERIA:

INDICATORS:

ACTIVITIES:

SOURCE:

ACCESS TERMS:

Fig.2 - Data Collection Categories for Competency Assessment Techniques.

which seemed to represent the most comprehensive, conventional and feasible methodologies for assessment. The definitions of the eight assessment strategies are presented below.

(1) Field Experience. Field experience refers to assessment which occurs in the real world context, that is, assessment which occurs in a real job situation or internship. Performance which occurs in this situation is subject to real world effects and tends to demonstrate competence at its most functional basis.

(2) Actual Demonstration. Actual demonstration is assessment which occurs in a field setting where many but not all of the real world effects are allowed to influence student performance. Since student access to field settings occurs through invitation or through agreement with cooperating institutions, some control exists to limit real world effects.

(3) Simulated Demonstration. A simulated demonstration refers to a microcosm type demonstration. In this case many of the variables affecting performance are controlled or manipulated. Effects due to change or real world contingencies play only a small part in the assessment situation.

(4) Portfolio. A portfolio is a collection of written materials, audio/visual, artistic, or craft products which are submitted as indication of field competence. A portfolio is generally composed of materials developed during the course of a program or some professional experience and is used to infer job related competence.

(5) Paper/Projects. Normally paper/projects refers to a product emerging from a major assignment. Examples include term papers, slide/tape productions, musical compositions, and so forth. Paper/projects may also refer to smaller assignments and projects. The idea here is that the work produced by the student is examined and assessed as an indicator of some knowledge, attitude or skill obtained during instruction.

(6) Oral Presentation. Oral presentations are student-controlled summaries and discussions which reveal (1) the activities involved in, (2) the progress of, and (3) the findings related to student projects or papers. The oral presentations are more than impromptu conversations. They allow the audience to ask questions or

make comments which may require the extension of ideas through in-depth responses. Thus, such testing is more flexible than written presentations, though less detailed.

(7) Oral Test. An oral test is a strategy in which students respond to a set of questions specified by an examiner or group of examiners. This strategy allows flexibility in pursuing answers more fully and clarifying responses, though this is generally at the expense of the organization and detail present in a written response.

(8) Written Test. Written tests are generally of two types: selected response (true-false, multiple choice), and constructed response (short answer, essays). There is virtually no interpersonal interaction in such tests, and competence is assessed on the one-way communication of the student with the written materials.

We first divided these strategies into tests of cognition, demonstration, and performance. This classification evolved to a five-level elaboration: cognitive, cognitive-affective, affective, cognitive-affective-psychomotor, and psychomotor. Neither scheme seemed to be helpful for strategy organization. We finally agreed that a separation into two subdivisions of (a) measures of competence and (b) indicators of competence, as illustrated below, was most appropriate:

(a)	(1)	Field Experience	Measures of Competencies
	(2)	Actual Demonstration	
	(3)	Simulated Demonstration	
(b)	(4)	Portfolio	Indicators of Competencies
	(5)	Paper/Projects	
	(6)	Oral Presentation	
	(7)	Oral Tests	
	(8)	Written Tests	

Assessment strategies as measures are distinguished from strategies as indicators because measures assess actual performance

in real or simulated job settings, while indicators assess behaviors thought to be more or less related to job performance. The assessment strategies of (1) field experience, (2) actual demonstration, and (3) simulated demonstration are said to measure competence because they attempt to record the existence of specified, necessary job skills and attitudes (i.e., the identified competencies). The assessment strategies of (4) portfolio, (5) paper/projects, (6) oral presentations, (7) oral tests, and (8) written tests are said to be indicators of competencies because they do not test actual performance either in simulated or actual job situations. Instead, from these strategies, one infers what performance might be like in these situations.

This highly useful distinction between measures and indicators led to the problem of determining "good" techniques for assessing each competency.

Measures of Effectiveness

Effective assessment outcomes are critical to a competency-based program. Determining the effectiveness of CBE assessment outcomes has been a problem in the CBE movement since its inception. Many of the problems may be due to the limitations of the measurement art. We believe, however, that these problems may be more a matter of lack of experience with the technology of performance assessment than a true limitation.

Our approach to effectiveness analysis was first to ask the

question: To what degree do the assessment strategies accomplish what they set out to accomplish? This is more or less equivalent to asking: Is the assessment strategy valid? Thus, in one sense, effectiveness analysis of assessment strategies will be identical to a validity analysis. We selected this technique as the most appropriate approach to performing a primary effectiveness analysis.

Validity analysis seems a necessary but not sufficient response to developing measures of effectiveness. A number of other questions are also important in considering the effectiveness of a given strategy. For example, how practical is it? Is there a reasonable expectation that the requisite mix of faculty experience and appropriate environment can be created? How complex are the directions for an assessment instrument? If the procedure is too complicated, will it affect the results? How much effort is involved in constructing, administering and scoring the assessment technique? While we are confident that primary effectiveness analysis can be made to yield good quantitative data, other kinds of data are also important in making judgments about how "good" a particular technique may be when used to assess a student's competency. Data on these qualitative questions is considered when performing a secondary effectiveness analysis.

The careful separation of quantifiable measures from qualitative measures clarifies the decision-making process without suggesting that one type of measure is any more important than another. Figure 3 demonstrates how the evidence on the comparative effectiveness for a set

of strategies for each competency as well as for clusters of competencies can be arrayed in matrix form. What follows is a brief exploration of procedures for primary and secondary effectiveness analysis.

Primary Effectiveness Analysis. A basic assumption of CBE is that assessment strategies which examine performance provide the best measures of competence. The closer measures are to real world contexts, the more valid they tend to be. Strategies which are increasingly removed from real world contexts are potentially less valid as measures of competence. By this reasoning a simulated demonstration would be less valid than a field-based assessment (by how much is not known). Similiarly a portfolio assessment would be less valid than a simulated demonstration. Validity is defined as the extent to which an assessment strategy does the job for which it is used.[34] When a strategy which has been designed to measure a competency actually does so, it is said to be valid. When an assessment strategy which has only the power to infer a competency is used to measure one, there is need to question its validity.

Effectiveness analysis of any assessment strategy is based upon one fundamental question: To what degree does the given assessment do what it is intended to do? Attempts to answer this question have been a primary focus for those in the field of educational and psychological tests and measurements. The research literature from this field can be of considerable assistance in resolving competency-based assessment problems. Holloway strongly states that the future success of CBE problems will depend upon what CBE educators know about the

		CRITERIA				
		VALIDITY	RELIABILITY	OBJECTIVITY	PRACTICALITY	
					CONSTRUCTION	ADMINISTRATION	SCORING
STRATEGY	FIELD EXPERIENCE					
	DEMONSTRATION: ACTUAL					
	DEMONSTRATION: SIMULATED					
	PORTFOLIO					
	PAPER-PROJECT					
	ORAL PRESENTATION					
	ORAL EXAM					
	WRITTEN EXAM					

Fig. 3 - Effectiveness Analysis Matrix.

general field of tests and measurements.[35]

It is the concern of experts from the tests and measurement field to measure qualities, characteristics, skills, and/or competencies within an individual and to determine the effectiveness of their measures. The term "test" is usually considered to mean the presentation of a standard set of questions to be answered, the result of which is a score or numerical value which is said to represent the extent of a characteristic or a quality that a person possesses.

Test developers are not always satisfied that the tests they construct actually measure the characteristics they were designed to measure. This may be why they take great pains to determine the degree to which the tests actually measure what they are intended to measure. This is called test validation and requires an examination of the reliability of a test plus a closer examination of various types of test validity.

A test's reliability is that portion of the result (the score) that is due to systematic errors and persists, therefore, from sample to sample, or from one administration of the test to another.[36] Reliability reflects the degree to which the test can deliver the same or similar scores with each testing, or deliver scores which reflect the true differences among students. Indications of reliability are presented in the form of coefficients of reliability. Reliability is considered a necessary condition for test validity but not a sufficient one.

Kerlinger says

> Reliability, while not the most important facet of measurement, is still extremely important ... High reliability is no guarantee of good scientific results, but there can be no good scientific results without reliability. [37]

For example, the test may be reliable but it may measure the wrong thing.

The determination of whether or not a test measures what it is supposed to be measuring is examined in validity analysis. Validation is a procedure that provides "evidence that an inquiry is free from bias or otherwise conforms to its declared purpose."[38] In the absence of bias, we know that the results are not influenced by other factors and can be believed.

Test validity is not easily attained and at best is a matter of degree. Mehrens and Lehmann state:

> A test may have many validities, each dependent upon the specific purpose for which one uses the test. Eventually the validity of any test is dependent upon how it is used in the local situation.[39]

Test validation involves an examination of four types of evidence: (1) content, (2) mental constructs, (3) relevant criteria, and (4) appearance. Each of these forms of evidence is discussed briefly below in the manner typically employed by test and measurement experts.

1. Content Validity. The test is examined to determine how the content of the test samples the domain about which inferences are made. An individual's test score can validly infer his/her knowledge of a subject only to the degree that the test has adequately sampled (i.e., provided representative examples of) the subject domain.

2. Construct Validity. The test is examined in terms of the degree to which the test scores can be accounted for by certain constructs of a psychological theory. It is interesting

to reflect on how this notion might be replaced in CBE by competency validity which would examine the test in terms of the degree to which the scores can be accounted for by certain competencies.

3. Criterion-Related Validity. The test is examined in terms of its relationship with external measures (which measure the same or similar things). For example, success in college (Grade Point Average) is indicated by certain other tests or measures obtained in high school (i.e., SAT, High School GPA). Such an examination speaks essentially to predictive validity. That is, the ability of a test score to predict other types of performance.

(4) Face Validity. Here the test is examined in terms of its ability to show how "on the face of it" that it measures what it says it measures.

The technology of test validation is a sophisticated one, based on a long history of theoretical and applied research. It is our belief that this rich body of research can be mined to suggest ways in which test validation can be applied to forms of assessment other than the written test. This is the next major phase for research on competency assessment.

Secondary Effectiveness Analysis. A number of qualitative dimensions have been proposed in the literature that also purport to measure the effectiveness of assessment techniques. Examples of these dimensions include the determination of adequacy and appropriateness of assessment outcomes.[40] Doughty et al. suggest communicability, feasibility, and utility.[41] Knapp and Sharon add equitability.[42] Kelly proffers ethicality.[43] Meherens and Lehmann propose objectivity and practicality.[44] Cost, of course, is a major criterion, so much so that we have elected to separate it from the other dimensions and to treat it as an independent category to be discussed in the next section.

Each of these characteristics pertains to some dimension of an assessment strategy which may influence the choice to keep or remove the strategy from the total assessment program. For example, equitability addresses the fairness of the assessment strategy. Scriven advocates an "inspecting process" which searches for injustices within the assessment strategy.[45]

> Whatever the outcomes, there are certain types of procedure (sic) that are inappropriate for moral reasons, and inspection of process must be made to see whether excess cruelty, inequitable methods of grading, etc. are important.[46]

Clearly where there is evidence that the assessment technique is really not fair to the student, educators are obliged to discard it, or to alter it until it is equitable.

Two problems are associated with secondary effectiveness analysis. One is the problem of what to consider when conducting secondary analysis. Since there are many characteristics suggested and since some even appear to conflict, selecting the appropriate ones can be a problem. However, this perhaps should be treated as a local problem to be decided according to the circumstances and conditions under which the analysis is taking place.

The second problem relates to definition. Most of the terms suggested above are too vague to apply reasonably. Even though the ultimate meaning of any of the terms will be determined by the location and conditions of analysis, a more precise and common set of definitions would be an important contribution. This also is part of the next phase of research.

Secondary effectiveness, however poorly defined at present, is important because it imposes a realistic perspective on effectiveness-based decisions. There are always more things likely to effect the selection or rejection of an assessment's strategy than validity alone. Secondary effectiveness analysis assures a more comprehensive analysis.

A distinction is often drawn between measures of effectiveness and measures of efficiency. Efficiency questions focus on the consumption of time, money, and effort. It is to those we turn in the next section on cost analysis.

Measures of Efficiency - Cost Analysis

In general, cost analysis attempts to discover the potential and/or actual costs of a program. As the term is used here, cost means the expenditures of human and monetary resources for the development and operation of programs. As it is currently conducted, cost analysis concentrates largely on the monetary resource expenditures. However, there is increasing attention given to the expenditure of human resources as well. This distinction between human and monetary costs provides the basis for a two-part analysis of costs in much the same way as that drawn above between primary and secondary effectiveness analysis. Monetary costs are quantifiable and will be used for the primary cost analysis. Human costs may be more qualitative in nature and will be the focus for secondary cost analysis.

Primary Cost Analysis. Cost, as defined by economists, is "the best alternative forgone."[47] However, cost will be used here in a more general sense as "a common and universal measure of the nature and quantities of resources used in a specific manner to achieve stated objectives."[48] A universal standard is necessary in order to be able to compare among alternatives (programs, assessment strategies, etc.) in order to choose among them. In cost analysis, the universal standard is usually dollars and, although there are some difficulties that will be discussed below, it seems the best reflection of cost available.

Life-Cycle Costing

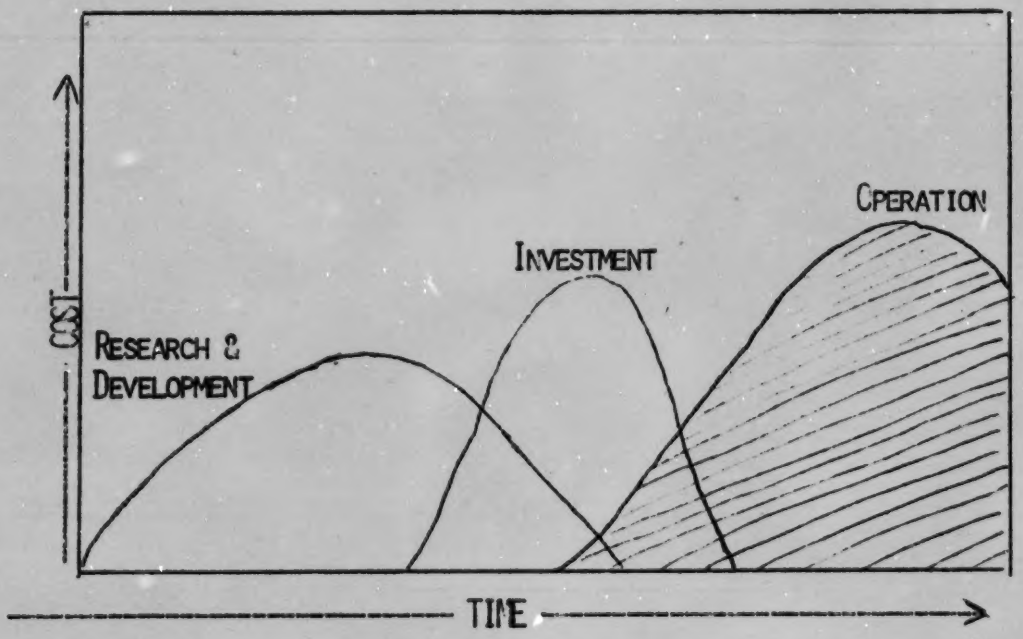


Fig. 4. Life-Cycle Costs

We have adopted a function by resource approach to costing following Doughty & Beilby[49], Carpenter[50], Stace[51], and others. Program activities (functions) are analyzed in terms of the expenses they generate. These expenses are then distributed among the various categories of resources. The cost of these resources (personnel, equipment, facilities, material) is then estimated using standard prices for comparable resources. Methods of costing not based on the resources necessary for each individual or for each specific program or activity can suffer from one of two possible errors in estimation. First, costs may be included which would not be charged to any single program, because, for instance, they are shared among several programs. These are referred to as joint costs and will be discussed more fully later. Including joint costs entirely in a single program or activity thus inflates the apparent costs. The second error is the obverse of the first. Costs which are obscured by more traditional accounting and budgeting procedures may be omitted thus depressing the actual cost of a program. "(Function/)Resource cost analysis is designed to provide cost estimates which permit equitable comparisons among projects (strategies), where cost or cost/effectiveness is the basis of comparison."[52]

Although the cost model used by Doughty et al[53] and others examined developmental as well as operational costs of programs, we will disregard the developmental costs and concentrate on operational costs. The shaded portion on Fig. 4 indicates our focus. We do this in order to analyze costs along a third dimension -- that of the eight assessment strategies. Our cost analysis model, then, analogously to the effectiveness model,

can be shown as a three dimensional matrix displaying operational costs generated by the interaction of functions with resources with assessment strategies. Figure 5 graphically portrays these dimensions and their inter-relationships.

The procedure begins with the identification of a set of functions that are mutually exclusive yet collectively include all the activities that take place in the assessment process. A parallel process involves the determination of all the resources used. Both function and resources categories must be carefully and explicitly defined so that an observer or a participant can tell what is included in a specific function and/or to which categories a certain resource belongs. The next two sub-sections provide the function and resources classifications with definitions.

Assessment Function. Assessment functions are the discreet activities associated with an assessment strategy. Functions represent what an instructor, supervisor, or credentialing agent actually does in the course of assessing the student. Six assessment functions have been identified:

(1) Development or revision (of instruments and procedures)
(2) Administration
(3) Analysis
(4) Management
(5) Advisement on Non-Competence
(6) Aggregate Judgment of Competence

These are defined as follows.

(1) Development/Revision. After the initial development of instruments and procedures, revision refers to the adjustments made of an assessment strategy prior to its use. For example, the questions on a test may need revision. The instructor may improve questions, test procedures, or format. Revision also

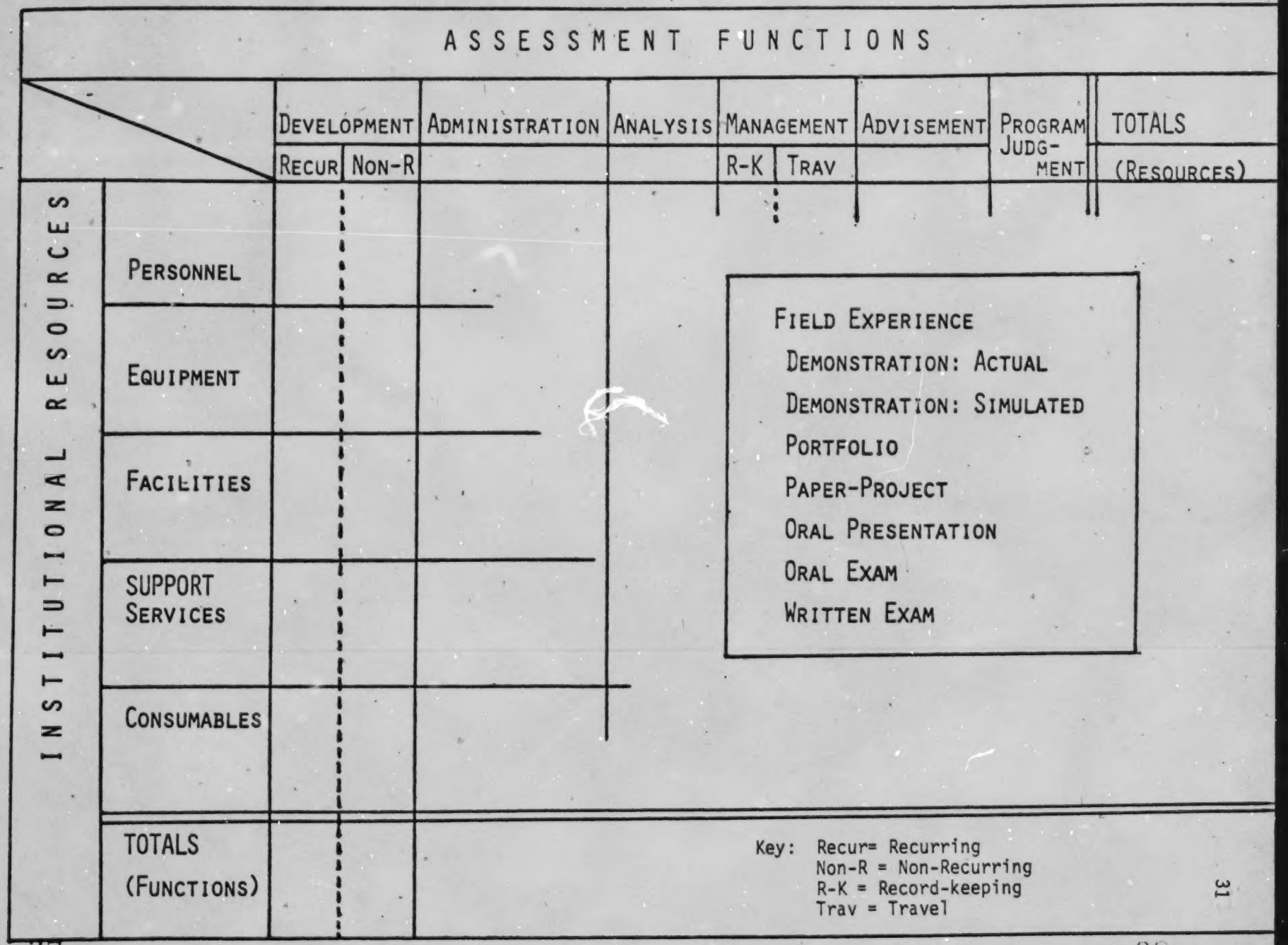


Fig. 5 - Primary Cost Analysis Matrix.

includes the incorporation of new information. In fields where high technology or major philosophical shifts require frequent, drastic revisions, this function becomes a central cost.

(2) Administration. Administration includes the time and procedures necessary to assess students. Traditionally, the standards for this function are the classroom time and activities used to give paper and pencil tests. Administration becomes more complex and costly as higher order assessment strategies are employed. Included in Administration are travel costs for site visits.

(3) Analysis. Analysis refers to the activities associated with examining, processing and interpreting performance data from a particular strategy. Judgments of competence or non-competence are based on analysis. The most familiar form of assessment analysis is test correction and scoring. Less familiar forms of analysis are (a) observations related to field assessment, and (b) analysis of paper/projects, portfolios, and oral presentations.

(4) Management. The management function refers to the activities of recording and reporting data and analyses. Normally these activities relate to student grades. However, where instructors approach assessment data with an eye to developing or improving student competence, recording and reporting assessment data become crucial to providing valid diagnosis and prescription. Management also includes planning assessment programs for a semester.

(5) Advisement on Non-Competence. Advisement on non-competence involves all the activities of dealing with students who fail to achieve necessary levels of performance. CBE programs normally recycle these students, but only after advising them of error and misconception. In graduate level courses this function may lead to counselling students out of a program or field and, if appropriate, into another.

(6) Aggregate Judgment of Competence. This function refers to the summative judgment given on a student's cumulative performance at the conclusion of a program. It is the point at which the department, institution, or credentialing agency certifies the overall student competence. The function, as its name suggests is the aggregation of all the separate assessments into some single, final decision that a student is or is not ready for professional practice.

Resources. As proponents of program budgeting know, identifying all the resources used solely for a particular program, (or, in this case, an assessment strategy) is not an easy matter. Institutional budgeting and accounting systems are generally based on jurisdiction rather than function/resource. Jurisdictional accounting, as the name implies, accounts for the allocation and expenditure of funds by each organizational unit rather than for the actual function for which the funds are used. Jurisdictional, or line-item, accounting is too general and undifferentiated to use in attempting to determine how much a given program, or set of assessment procedures, will cost.

In order to identify the resources which go into a specific program, it is necessary to identify the various functions and then to specify what costs are constituted by resources used in these functions. Costing generally occurs, then, by estimating the percent of time for faculty and staff, the percent of use for facilities and equipment (where not totally allocated to a single program), and the cost of comsumables. (Typically for education, the major costs are for faculty time) These functional estimates are then translated into dollar costs, where possible, from accounting or budget figures.

Resources, then are the entire variety of individuals and materials (people, supplies, equipment and facilities) necessary and available for carrying out the assessment functions. Five resource categories are identified for cost analysis of assessment strategies.

(1) Personnel
(2) Equipment
(3) Facilities
(4) Support Services
(5) Consumables

They are identified as follows.

(1) Personnel. Personnel are those individuals who function within a discreet instructional unit such as an adademic department, or in association with such a unit. Typically they are (1) instructors and field supervisors, (2) managers, and (3) support staff. The critical group consists of the instructors and field supervisors who handle the actual student assessment. Therefore, an analysis of how instructors and field supervisors spend their time on student assessment is critical to a cost analysis of that activity. However, the contributions made to the assessment process by unit managers, (e.g. chairpersons or deans) and secretarial and clerical staff must not be overlooked. Thorough analysis will consider the total contribution of all personnel with respect to the assessment process.

(2) Equipment. Equipment includes the durable, reusable hardware and software used in the assessment process. These may be books, computers, games, media equipment, etc. Equipment is distinguished from consumables because the former is used more than once.

(3) Facilities. Facilities are classroom, office, and other specialized areas necessary for assessment. When a facility is basic to all assessment strategies, it is not usually included in cost analysis. However, where a specific facility is necessary to only a certain type or class of strategies, it must be costed.

(4) Support Services. Support services refer to those services provided to aid the assessment process. Examples are (1) teaching assistants whose duties consist of administering and analyzing student assessment data, and (2) computer services used to analyze and report assessment data. An important new support service in assessment programs are those services provided by assessment centers.

(5) Consumables. Consumables are those materials which are used during the assessment activity but which are not re-usable at its conclusion. Typically these include answer sheets for paper/pencil tests, record keeping booklets, computer printouts used in assessment, observation forms, etc.

Primary cost analysis thus involves the direct costing of function times

resources times strategies and the eventual derivation of an actual dollar amount for each assessment strategy or combination of strategies in a given assessment system. A cursory inspection of the cost analysis matrix (Figure 5) may make the costing procedure appear deceptively easy. However, there are many problems, major and minor, that should be acknowledged in conducting cost analyses. Three cost-related concerns fundamental to the proper application of the model described here are:

(1) Distinguishing different types of costs

(2) Choosing the basis for cost comparison

(3) Accounting for variance in time and usage estimates.

A brief description of each of these follows.

Types of Costs. It is essential to be able to distinguish among different cost categories as confusion of one type of cost with another will distort the analysis and result in either under- or over-estimation of costs. Some of the basic costs which a cost analyst must be able to differentiate are fixed and variable costs, recurring and non-recurring costs, joint costs, and sunk costs.

Fixed costs are those costs which remain stable despite fluctuations in a program's operations. Most major capital expenses are regarded as fixed costs. Costs for facilities are usually fixed, since building mortgages and upkeep continue at a fixed level whether there are many or few students. Variable costs are costs which are directly related to the level of activity of the system. Thus, expenditures for materials are variable costs, since the more students there are, the more materials are required.

Recurring costs are those which occur during each and every cycle of a program's operation. Non-recurring costs are one-time costs during a program's life, for instance, costs for research and development. If these two types of costs are confused, especially when a non-recurring cost is listed as a recurring one, the entire program operation cost is inflated. In the cost matrix presented for use here, there are only recurring costs, since the analysis deals solely with operational costs of assessment systems.

Joint costs are those costs which must be allocated to more than one program or jurisdiction. They are costs which are shared. For example, different instructional programs may share the same equipment, or teachers may teach in more than one program. Determining percentages of use and time for such joint costs is crucial but difficult.

Sunk costs are those expenditures which have already been made at some time in the past. A common error in cost analysis and in decision-making is to include sunk costs in future projections of the cost of a program. Once resources have been irretrievably allocated, they should be disregarded in calculating program costs. This reflects the approach of using the "present worth" concept of economic analysis, which allows all costs and decisions to be based on the value or resources at the moment of analysis. The general principle behind ignoring sunk costs is to avoid committing resources which are still flexible in the present, on the basis of the past worth of resources which have been allocated and therefore, in effect no longer exist. This procedure allows each decision to be based solely on the current value of flexible, available resources.

Basis of Cost Comparison. There are essentially two kinds of comparisons which a decision-maker may want to investigate. First, decision-makers may want to compare the absolute costs of various strategies or clusters of strategies in order to identify the general array of costs involved in every strategy or combination of interest. The focus is on general strategy comparison for which strategy comparable costs must be gathered. These costs include virtually everything which is necessary to any of the assessment strategies. There is one exception. Where all strategies require the same basic resource (e.g., classroom space), then that resource need not be included since adding this cost merely inflates the cost of each strategy by a similar amount and gives an unduly high estimate for all strategies. Resources which can generally be eliminated from costing in this manner are basic resources which are fundamental to the enterprise of education and not unique to any particular program or activity.

The second type of comparison that decision-makers may want to investigate is one which indicates which strategy or group of strategies is most appropriate for a particular situation or setting. Program specific costs are appropriate for such comparisons. These costs are costs only for resources which are not already available to a program. Resources which a program already has would not be included in costing of a particular strategy. For instance, if a simulation strategy required use of an assessment center, and a center already existed and was accessible, then construction, maintenance, and staffing would not need to be included. Only the costs per use of the center would be figured

into the strategy. However, if no such center existed, then all the costs associated with creating one would have to be included in the strategy cost analysis.

These two different comparison contexts -- strategy comparable costs and program specific costs -- are both important depending on the level of decision-making involved. If a federal or state agency is estimating average costs for a series of assessment systems, the former method may be more revealing in providing some sense of overall costs. If a specific program is attempting to determine its own system, the latter analysis is, no doubt, of more use.

Time and Usage Estimation. A major problem is the lack of validity and reliability data for the various estimates of time and usage which underlie the cost in the function/resource matrix for each strategy. However, there are ways to increase the validity and reliability of the estimates. First, clear definitions of functions will help the estimator (and the faculty member) distinguish activities (functions) and so estimate more accurately the proportion of time spent on each one. Second, redundancy of estimation in the form of multiple measures repeated over time will help identify any inconsistencies and provide some sense of the variance in responses. Third, well conceived and validated measuring instruments and techniques will obviously increase confidence in the final estimates.

Rating scales, interviews, self-report plans and institutional requirements are some of the typical procedures for gaining such information.

More sophisticated techniques, for example some of the procedures used in perceptual psychology, decision analysis, values clarification and research, can be adapted when the costs are significant enough to warrant such an investment.

In the last analysis, a sensitivity analysis may reveal that over- or under-estimates of time may vary widely before any substantial effect on the choice of strategy occurs. For example, it is quite possible that any systematic over- or under-estimation of time or usage may occur across all strategies and thus, effect all estimates equally. In sum, where the analysis seems grossly distorted, then experience, common sense, and intuition should be used to help give a more accurate reflection of true costs.

Secondary Cost Analysis. By and large current cost analysis disregards non-material costs because it is difficult to assign numerical values to these costs. Secondary cost analysis, however, consciously considers these non-material costs. Typically these are social costs, psychological costs, lost opportunity costs, and the like. Because dollar values are not easily assigned to such costs, they tend to be overlooked and thus important decision-making information is discounted.

In fact, the designation "secondary cost analysis" is a bit misleading. The consideration of non-quantifiable costs and unintended outcomes is secondary only in the sense that the techniques for evaluating such costs and events are much less exact and less easy to apply. The concerns in secondary analysis are often more significant and have a

greater impact on decisions than those dollar concerns considered in the primary cost analysis. This is particularly true when secondary analysis involves political and social issues which have ramifications for the public interest beyond the scope of dollars spent. For example, if a new competency-based program with high standards produces fewer graduates, albeit with better skills, there will be ramifications. There is a cost to the segment of the public which might have received some service, though of lesser quality, but must now do without any service while waiting for better trained graduates. On the other hand, there are a different set of costs when more graduates are produced but some are only capable of sub-standard service.

Some of the more fundamental secondary (or qualitative) costs for CBE are:

(1) Social Costs
(2) Opportunity Costs
(3) Accuracy and Information Costs
(4) Inflexibility Costs
(5) Political Costs

These will be discussed in turn below.

Social Costs are those negative external outcomes which affect large segments of the public. Pollution, traffic congestion, nuclear contamination exemplify social costs. Economists often refer to these as "externalities", a term used to designate costs of production not directly borne by the producer. Externalities may produce either positive or negative effects.

Opportunity costs are the cost of the next best alternative for

which resources could have been used. This definition coincides with the economic definition of "cost" referred to earlier. It simply means that if the alternatives are to select a performance-based CBE assessment system or a new information management program, the cost of the assessment system is conceived as the cost of the new program, the next best alternative given up or forgone. Expressing costs as opportunity losses is often much more dramatic than simply presenting a dollar expenditure amount because it forces people to confront graphically the things they are giving up when they choose one alternative over another.

Accuracy and information costs refer to the cost of acquiring additional information in order to be able to make a more accurate judgment. Increased accuracy requires increased information which entails increased cost.

Inflexibility costs are those costs associated with decisions which cannot be easily reversed. Often resources must be committed irretrievably in choosing one program over another or one approach to strategy assessment over another and not much can be salvaged if a later decision is made to abandon the project.

Finally, political costs are those costs which occur generally to decision-makers, and which involve losses in power, status, position, or office. The most obvious case of such costs is one where a politician supports an unpopular law and is not re-elected because of it. This is not a trivial factor inasmuch as much of the drive behind CBE is political rather than (or perhaps as well as) educational. Thus the political

costs of adopting or not adopting competency programs and assessments should not be ignored in the activity of cost analysis.

Each of these types of cost resists easy quantitative analysis which would permit an assignment of a dollar value to them. Therefore, they are often overlooked or sidestepped. One tactic in cost-effectiveness studies is to view such costs as "negative" effectiveness and to let the effectiveness analysts wrestle with the difficulties of measurement. Our position is that the secondary costs are too important to be neglected and thus hospitality to these qualitative factors has been provided in our model.

Even though dealing with these secondary costs is difficult we can suggest some guidelines. First, when dealing with costs which are not easily quantified, for instance, the costs to students of faulty evaluation which mistakenly eliminates some competent individuals from a program versus the costs to society of faculty evaluation which passes non-competent students into public practice, the various costs can at least be ranked according to their perceived importance. Thus, given limited resources, if it is felt that society's well-being has relatively more value than that of each student, then a system can be designed which requires more expert performance and is less lenient in borderline cases even though no dollar cost is placed on such values. (In practice, dollar amounts can often be found for such costs through the measurement of expected utilities of decision-makers or of certain segments of society. See the decision analysis literature for a more complete account of these techniques.[54])

A second technique for dealing with secondary costs is to get some estimates of how important these factors are in the overall decisions to be made. In the above example, one approach might be to determine how much a possible student or public lawsuit might cost an institution if it were determined that the assessment strategies for determining competence were either too stringent or too lenient, and what the possibilities of such judgments might be. Given these estimates, an analysis could be made which would reveal whether different strategies or standards should be used, and at what point additional costs for better assessment cease to balance the costs to students and society. In other words, if a student lawsuit might cost an institution $10,000, and the likelihood of such a suit was 1 in 500, then the expected cost would be $10,000 X .002 - $20 per 500 students trained. If the cost of assessment to reduce the likelihood of such an occurrence to 1 in 1000, or .001, was $20 per student, or $10,000 for 500 students, then investment would not be reasonable.

Many people are extremely uncomfortable putting questions of value into monetary terms, however vague. Still it is essential to realize that putting dollar costs on values such as "fairness to students" or "responsibility to society" occurs at every juncture of the academic process where allocations of scarce funds are made to one type of activity and not another. The argument above is not meant to indicate that student concerns are unimportant or always of lowest priority. Instead, it emphasizes rather dramatically that tradeoffs are fundamental to most decisions, and it forces decision-makers to

understand that the abstract idea of assessing competence has very real and often contradictory consequences for students and the public.

Although these secondary costs should not be ignored, it is generally not worth the investment to attempt to be too refined in placing monetary values on all costs or anticipating fully all outcomes. More often than not, an awareness of these costs and potential effects may be sufficient.

Having discussed in some detail the two primary dimensions of the model we have developed -- cost and effectiveness, we are now ready to bring the components together as we turn to a discussion of the model for cost-effectiveness analysis of assessment strategies for competency-based education.

The Cost-Effectiveness Model

Figure 6 provides a graphic overview of the model. It is drawn to illustrate the way in which the cost-effectiveness analysis of assessment programs is to be approached. It is once a cost analysis and again an effectiveness analysis. The two analyses are undertaken for the purpose of exposing differences between alternative assessment strategies. The data developed are then recapitulated in summary form in such a fashion that the decision-maker can focus on the pertinent and relevant facts in order to make informed decisions and reasonable policies.

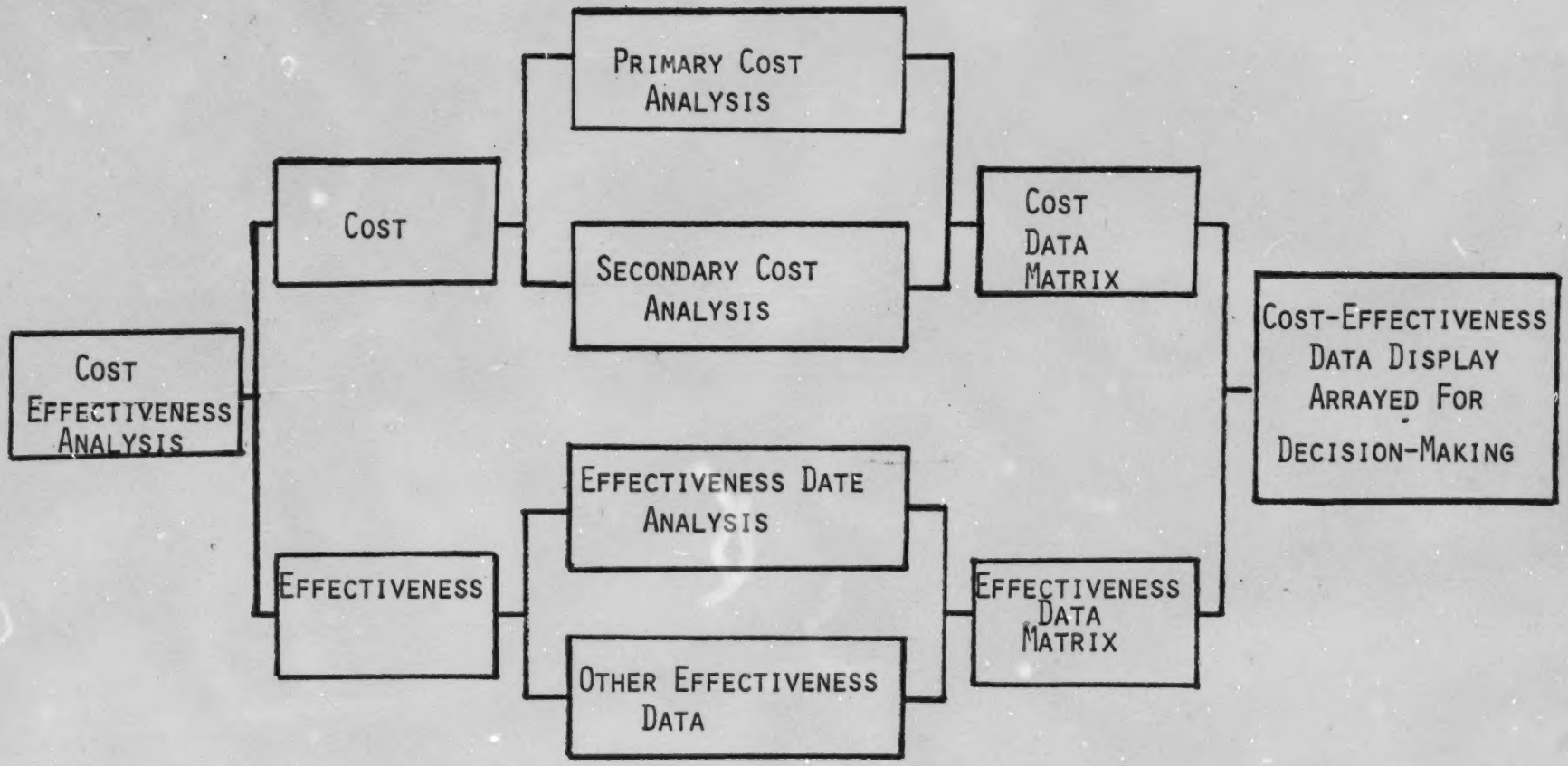


Fig. 6. General Cost-Effectiveness Analysis Model for CBE Assessment Programs.

The bulk of the analysis effort is concentrated in the center of the model and is represented by the four blocks:

1) Primary Cost Analysis
2) Secondary Cost Analysis
3) Primary Effectiveness Analysis
4) Secondary Effectiveness Analysis.

The results of the first pair of analyses are placed in the Cost Data Matrix and those of the second pair in the Effectiveness Data Matrix. The data from these matrices are condensed again and brought together in the Data Display for Decision-Making.

The dichotomous approach -- cost and then effectiveness -- is used for the sake of completeness. It has the advantage of pointing up to analysts what they typically overlook in approaching cost-effectiveness analysis. The division into primary and secondary parts, more or less corresponding to a division into quantitative and qualitative measures, gives the decision-maker an opportunity to see what is critical and what is less so. The final choice then should be based on a holistic view of the situation, even though circumstances may dictate against detailed secondary forms of analysis. Here, however, the decision-maker can control the analysis process by selecting which elements of secondary analysis will stay in the final array and which will be omitted. The detailed description of the elements suggested for inclusion in the secondary analyses (given in the two previous sections above) should assist in making analysts and decision-makers fully aware of the reasons why certain secondary analysis has not occurred.

The Matrices. Cost analysis and effectiveness analysis are greatly facilitated by the use of matrices. Doughty and Stakenas make a strong recommendation for their use in reporting and relating information for decision-makers.[55] In addition to their value in communicating information, matrices are useful as a format in which to arrange data en route through the analysis. Often matrices become part and parcel of the analysis process and may even serve to guide the analysis itself. Matrices are used in the present model for all these reasons.

The Cost Data Matrix is used for three reasons: (1) to guide cost analysis, (2) to display and relate information for decision-makers, and (3) as a residual for the placement of available data. For the present the Cost Data Matrix is confined largely to primary cost analysis. The growth and development of the cost analysis of competency-based assessment programs may expand the use of this matrix to secondary cost analysis as well. The reader is referred to Figure 5 on page 31 for details on the Cost Data Matrix.

The Effectiveness Data Matrix is used in two ways: (1) as a residual for effectiveness data, and (2) as a reporting device. Principally the Effectiveness Data Matrix serves to display effectiveness data for analysis and interpretation. Unlike the cost matrix, however, the effectiveness matrix is not confined to primary analysis. Still the degree to which it will include secondary forms of effectiveness analysis data is highly situational. Because an effectiveness analysis is essentially a validity analysis, the data from such an

analysis may not require a matrix. The Effectiveness Data Matrix is recommended, nevertheless, because its use indicates to the evaluator the breadth of the analysis and it forces the evaluator to ask secondary analysis questions. Figure 3 on page 22 provides the detail on the Effectiveness Data Matrix.

Data Display for Decision-Making. The final major element in the general madel is the Data Display for Decision-Making. For the display of analysis data Doughty and Stakenas suggest a tabular array approach.[56] Their claim is that such an approach

> enables comparisons to be made of different kinds of quantitative data as well as qualitative criteria. Single dollar cost measures of an alternative are as uncommunicative and uninformative as any contrived single measure of effectiveness.[57]

They emphasize the need to let the array "reflect a set of cost and effectiveness measures suitable for use in making decisions."[58] They further suggest a two-dimensional field for comparison, which in this case would be Strategy by comparative Cost Effectiveness criteria, or

Assessment Strategy X Cost-Effectiveness Data

Figure 7 illustrates this arrangement.

Fixing Costs or Fixing Effectiveness. In using the model it is probably necessary to "fix" at least one of the two standards of comparison: cost or effectiveness. Fixing costs or effectiveness means setting some minimally acceptable level of effectiveness, or some maximally acceptable level of cost, and allowing the unfixed

Strategies / Criteria	Field Experience	Actual Demonstration	Simulated Demonstration	Portfolio	Papers-projects	Oral Presentations	Oral Exams	Written Exams
Effectiveness:								
Primary								
Secondary								
Cost:								
Primary								
Secondary								

Fig. 7. Data Display for Decision-Making

factor to vary. In comparing systems of assessment strategies, if there is a fixed resource limit beyond which costs cannot range, then the effectiveness of systems whose costs are under this ceiling is the criterion on which a selection will be made. Conversely, if a certain level of achievement is essential, for instance, reading at the national norm for grade level, then cost becomes the principal factor in choosing among programs which reach this achievement level or above.

There is another method for using cost and effectiveness criteria in which both cost and effectiveness are allowed to vary. In this method, alternatives are compared in pairs, the winner of each successive comparison being pitted against the next alternative until a single alternative remains. This method had advantages over fixing either costs or effectiveness because it allows optimization along both variables rather than just one. However, in any multiple variable decision analysis, there are two technical difficulties which complicate the process. One difficulty is the possibility that alternatives are superior on different criteria. In considering assessment strategies, this is nearly always the case. As strategies become more effective in measuring competence, they become more expensive. Thus, decision-makers must devise some weightings of criteria to choose between such cases.

A second difficulty of allowing both costs and effectiveness to vary is what is known in political science as 'the paradox of voting' which states that if there are at least three alternatives:

A, B and C, which are judged on several criteria, it is possible to prefer A to B, B to C, and C to A.[59] Then if these alternatives are compared in pair-wise fashion, any of the three alternatives could be the final choice. It would only depend on which pair is compared first.

No matter which method is chosen, fixing costs, fixing effectiveness, or pair-wise comparisons, there will be attendant difficulties and complexities. The best procedure seems to be to pick one method, determine beforehand what seem to be legitimate goals and tradeoffs, and stay with that method as long as seems reasonable. There will generally be some point at which informed judgment and preferences for certain outcomes will have to supplement the purely mechanical application of analysis procedures.

At this point we feel we have completely defined the cost-effectiveness model and its components. However, it is one thing to develop an ideal, theoretical model in the abstract and quite another to apply that model in a real situation. In the next section, we will describe some preliminary attempts to apply one aspect of the model through collecting primary cost data from faculty.

General Competency Assessment by Faculty

We had two specific purposes in this portion of the Competency Assessment study. First, we needed to examine how effectively competencies were presently being assessed within the regular courses

in a library school and in a school of education. Secondly, we needed to collect some baseline cost data both to test the primary cost matrix of our model and also to begin the process of building an empirical data bank of cost information. Our investigation of this section of our study was guided by four research questions:

1. What is the distribution of competencies within courses?
2. What is the distribution of assessment strategies within courses?
3. What is the cost of course-related assessment activities?
4. How is the effectiveness of assessment strategies to be determined?

We will discuss these questions in sequence.

Distribution of Competencies within Courses. A year and a half earlier we had interviewed all the faculty of the School of Information Studies and of the Area of Instructional Technology, School of Education to determine which competencies were taught in their classes in order to advise students which particular set of courses to take. Advisement followed a thorough diagnosis of each student's present level of skills and abilities with a joint determination of where the student needed to become more proficient. After the determination of a desired set of competencies to acquire or add to, the courses were then examined to see which group of courses would be the most appropriate for the student.

During this part of the project we went back to the faculty to ask them not just which competencies they taught but which ones

were actually assessed and in what manner the assessment took place. The interview protocol is included as Appendix C. We collected outlines, activities, assignments from faculty for each relevant course and then classified the types of assessment procedures that were carried out in each class. The interviews were analyzed and a new competency-by-course matrix drawn (see Figure 8). Not surprisingly, we found that the faculty teach more competencies than they actually assess.

Distribution of Competencies within Courses. A basic assumption that guided our work throughout the project is that the school media competency program must fit within a larger library school context composed of courses, many of which are general in nature, and directed to students who will work in a variety of library settings. We want to underscore the importance of this approach. The alternative assumption would be that the school media program would be treated as a closed system isolated and apart. Under this assumption, we might try to create a school within a school by developing a set of courses which exactly fit the school competency-based program and which prospective school media specialists would take by themselves away from the rest of the school.

We believe the broader approach has a number of advantages. It allows school media specialist students to relate their work to the larger context. Of equal or greater importance, it enlarges faculty awareness of the special needs and contributions being made by the modern school library media center. This positive

Competency Number	ITE 501	ITE 511	...	ITE 719	IST 502	IST 503	...	IST 657
1				X				
2		X						
3						X		
4						X		
38	X							
39	X			X				
40								
69								X
70				X				X

Fig. 8. Course by Competency Matrix.

benefit more than offsets the requirement for regularly checking with all faculty - old and new - for changes in courses, new content, new methods, etc. Competency assessment then becomes a dynamic process continually being adjusted to the changing issues and the changing environment.

Distribution of Assessment Strategies within Courses. We found in our re-interviews with faculty that there were redundancies -- many competencies taught and assessed from different points of view in different courses. We also found some gaps where competencies were not assessed at all through formal courses. Figure 9 shows the ranking of frequency of assessment by competency number. Each year this analysis needs to be a part of the process. Those competencies not being directly assessed through course work may be assessed through field work, independent projects, or on an individual or small group basis outside of courses. Plus, as a result of the analysis, suggestions will be made for course revision to include and/or to measure the attainment of other competencies where appropriate.

We also found that data did not always fall out as neatly as we might have liked. In some cases the data revealed that the courses allowed students to demonstrate only a few of the competencies, while in other cases many competencies could be demonstrated. In all cases, however, the courses considered more than the competencies of interest to the project and the faculty were assessing more than just those competencies. This is important

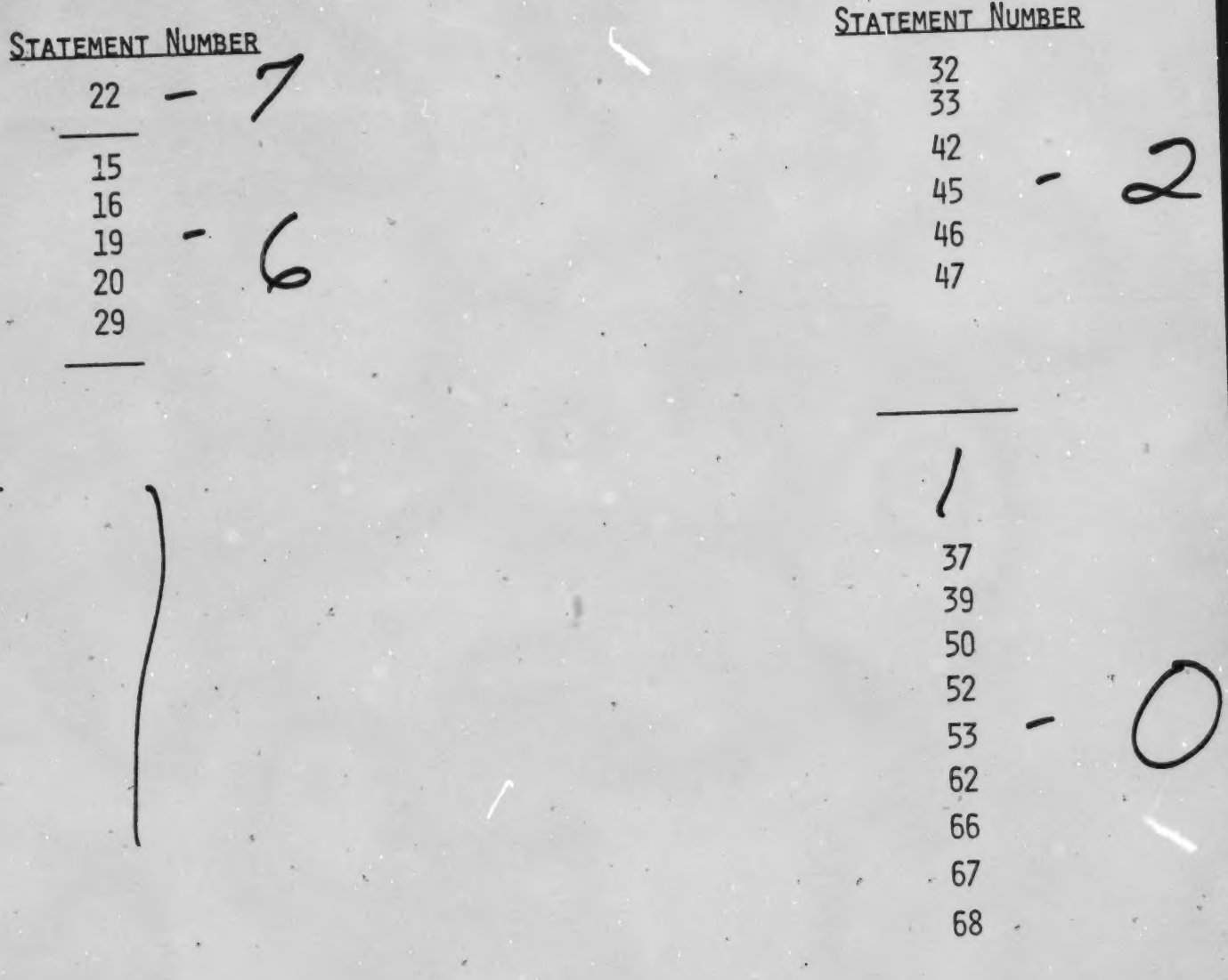


Fig. 9. Frequency of Competency Assessment through Courses.

as it means the competency-based program sets a floor rather than a ceiling. Many qualifying statements accompanied faculty responses. These statements explained the use of a given assessment technique. They emphasized the degree to which the technique assessed a given competency. And they revealed the instructors approach to assessment which led us to explore the impact of differing faculty styles of assessment.

Faculty Styles of Assessment. This spin-off study of evaluation styles of faculty used data from six of the graduate professors -- three from each of the two schools who are jointly responsible for the school media specialist competency-based program at Syracuse University.

We anticipated that a faculty member's pattern or style of assessment was likely to vary in two ways: first, with respect to the area of evaluation (personal, instructional, or research) and second, with respect to competence in assessment technology (test writing, statistical interpretation, test selection, etc.). We used a "conflicting modes of assessment" schema identified by Rountree.[60] These conflicting modes with a brief explanation of each are presented in Figure 10.

All the subjects used the internal mode and all emphasized the product mode of assessment. Generally assessment was conducted in the summative mode in the sense that findings were directed to a third party (the computer) as a grade. In most cases assessment through general course work was emphasized, although in two cases

FORMAL VS. INFORMAL ASSESSMENT. Formal assessment are those contrived tasks having no direct instructional function which provide knowledge about the student. Students are aware of this sort of assessment. Informal assessment is carried out on the basis of what students are doing anyway as part of their classroom and communal living. It is not paramount in the students' mind or the teachers'. Often the student is unaware of his being assessed.

FORMATIVE VS. SUMMATIVE ASSESSMENT. Formative assessment is that in which the knowledge gained about the student is used diagnostically to help the student grow, while summative is that in which the knowledge gained about the student's present state is reported to a third party who may use the knowledge in deciding what to do with the student.

CONTINUOUS VS. TERMINAL ASSESSMENT. Continuous assessment is viewed in terms of frequency where one is assessed on and off throughout the course. Terminal assessment is that which comes at the end.

COURSE WORK VS. EXAMINATION ASSESSMENT. Course work assessment may be what the student does during the course of his studies (e.g., discussion, assignments, mini-tests) or it may be treated in terms of process (i.e., what was done to make the product. Examination assessment involves a set of questions to be answered. Two common characteristics of this are (1) uniformity of task and (2) knowledge of what task is to be performed.

PROCESS VS. PRODUCT ASSESSMENT. Assessment can be founded in the processes undertaken to achieve a product. The processes allow the assessor to infer the outcome or product to which the processes are directed. Or assessment can be founded in the products developed. Here the product informs the assessor who infers from it the nature of the processes used to develop it.

INTERNAL VS. EXTERNAL ASSESSMENT. This is assessment which relates to who assesses. Internal assessment is by the teacher or possibly student peers. External assessment is performed by some qualified person or persons outside the course or institution.

CONVERGENT VS. DIVERGENT ASSESSMENT. Convergent assessment focuses on one or a few right answers. Divergent assessment invites alternative answers which can be justified.

IDEOGRAPHIC VS. NOMOTHETIC ASSESSMENT. Ideographic assessment aims at finding out about an individual in a way that provides a meaningful understanding of his uniqueness. Nomothetic uses the data on individuals for comparison with others and for generalizing from those assessed to others. It aims at understanding people in general.

Fig. 10. Rountree's Conflicting Modes of Assessment.

the alternative of assessment through examination was given major emphasis. In all but one instance the convergent mode of assessment was emphasized.

No major differences between groups or individuals emerged from the data. This may be due in part to instructional guidelines or to the limitations of an exploratory study. Less major differences were observed. Subject one, for example, served to illustrate the traditional style of graduate school instructors, combining assessment at the end of the course with an examination reflecting the student's skill in converging on right answers. At the other extreme subject three emphasized an ideographic or individualized mode using informal means of assessment equally with formal and paying little attention to the terminal mode of assessment. Subject three used no examinations, rather evaluation centered on course work, class participation, and course production. Although none of the faculty used the divergent mode to a great extent, subject three did emphasize divergent thinking (perhaps to be expected with an individualized approach) even though he required certain convergent behaviors for assessment purposes.

Although the differences were minor and not significant, this mini-study was useful in that the Rountree scheme suggests a way to determine a faculty assessment style and to plan assessment strategies based on that knowledge. It may prove to be a useful way to examine effectiveness.

Cost and Effectiveness of Course-Related Assessment Activities. We argue that it is necessary to collect specific cost and effectiveness data on a periodic basis and to compare results in order to make responsible resource allocations satisfying through sub-optimization the needs of the program, the school, and society. We have carefully developed a model that specifies the universe of cost categories and effectiveness criteria. The natural progression of the research project is to move to a field application of the model for all components of the program, not only here in Syracuse but at other sites as well. This field application is well beyond the scope of this project. However, we felt it was necessary to collect some baseline cost data for at least a preliminary test of the primary cost matrix of the model. The data collected can then be used in the future as the initial input to an empirical bank of cost information.

Three alternatives were considered for testing the cost model. We could look at costs of field work; we could set up an assessment situation outside of classes through simulation, laboratories and summative testing; or we could attempt to cost the assessment activity that was already going on in classes. The latter alternative was the most appealing as we expect it will have the broadest applicability to other programs.

We determined that we would collect primary cost information only and not try to grapple with social costs, psychological costs, lost opportunity costs, and the like. Nor would we try

to collect data to determine degree of effectiveness at this time. A simplifying assumption was adopted, i.e., that assessment through course work was primarily a function of faculty time. Faculty time was assumed to be differentially allocated to assessment activity based on: (1) whether or not the course had been taught previously, (2) the number of students in the course, (3) the number of competencies being assessed in the course, and (4) the faculty style of assessment (including the number of assessment activities).

Using these assumptions we developed another faculty interview protocol (see Appendix D) which asked the faculty member to estimate the number of hours spent on assessment activity for a given course, the proportion of that assessment time dedicated to the specified competencies relevant to the school media program, and the estimated accuracy of the estimates. Figure 11 shows the data collected.

We had decided not to try to collect data retrospectively in the various function categories of test administration, test analysis, test recording-reporting, and test-related advisement, but rather to be satisfied with a global measure as we felt that the accuracy level of the estimates were going to be somewhat low and it would further attenuate the accuracy to break estimates into more discrete categories.

We also asked the faculty to estimate the costs of material used in the assessment activity and any other costs associated with

1. Course number

2. Number of Competencies Available in Course

3. Number of Functional Areas Involved in Course

4. Assessment Strategies Employed in Course

5. Ratio of Number of Competencies Assessed To Number of Competencies Available

6. Actual Number of Hours Spent in Assessment Activity by Faculty Member

7. Estimate of Costs Other than Faculty Time

8. Level of Accuracy of Estimates

0	1	2
Wild Guess	Ballpark Figure	Accurate Estimate

Fig. 11. Cost Date Collected from Faculty.

assessment, for example, travel, graduate assistant time, equipment, etc. The time estimates were converted to dollars using a conservative factor (based on average annual professorial salaries divided by an estimated fifty hour work week) of $15 per hour. Cost of materials and other costs were also converted to dollar amounts.

Figure 12 shows a sample of the results collected in this pilot test. The two courses shown were very different in nature. ITE 719 is an administrative course; IST 612 is a children's literature course. Although more competencies were assessed in the administration course, there were twice as many students in the literature course and nearly three times the number of assessment activities undertaken. These factors account for most of the difference in total cost. The range of cost of the twenty-four courses for which data was collected varied widely although the mean and median measures were fairly close.

Obviously, only limited conclusions can be reached from this small retrospective data gathering effort. Many more factors would need to be included and real-time measures applied. The exercise did, however, indicate the feasibility of the approach and the willingness of the total faculty to assist in the data collection effort.

Comprehensive Evaluation of the Syracuse University Competency-Based School Media Program

A spillover of the research project was a fairly detailed

COURSE	HOURS	COST OF TIME	OTHER COSTS	TOTAL COST
ITE 719	31	$465	$30	$ 495
IST 612	84	$1260	$30	$1290

RANGE OF COSTS	$ 225	TO	$ 1470
MEAN	$ 804		
MEDIAN	$ 915		
TOTAL COSTS	$ 19,283	FOR 24	COURSES

Fig. 12. Cost of Assessment-Related Activities: Exploratory Study.

examination of the competency-based school media program which has been in operation for nearly two years. It was reassuring to realize that a great deal of mutual adjustment appears to take place informally. As faculty examined the new matrices and compared the set of competencies taught and assessed in their courses to those of other faculty, there were indications that courses would be revised to exclude redundancies and to add areas not well covered. The focus on assessment and the presentation of alternative techniques has acted as a catalyst for some actual and planned experimentation in a few courses.

As the model developed it became clear that the field work component must, of necessity, carry a major burden for competency assessment. We have revised the procedures of school media field work as a result. Students presently take from three to six semester hours of field work (150 to 300 actual hours on site) in some combination of elementary, junior and senior nigh schools. Field work is usually done towards the end of their course work. During the semester before field work, students complete a diagnostic self-assessment of competency attainment. The student is then interviewed and a set of competencies selected to serve as the field work focus. Placement is made on the basis of the needs. A fairly elaborate contract is then developed and signed by the student, the site supervisor and the faculty member. The contract specifies a particular set of activities that will allow attainment and demonstration of each competency selected for attention during the field experience. Contracts are reviewed

periodically and student progress monitored by the site supervisor and through two site visits by the faculty member. A seminar for all field workers is an additional enrichment activity.

We were initially strongly interested in the possibility of developing a comprehensive simulation that might be used outside of course work as an alternative method of assessing competency. This continues as a future possibility. To date, we have developed a number of parts of the simulation but it is used within the present management courses rather than externally.

A more formal and external evaluation of the program is scheduled for the spring when members of the original consortium will be invited to come together again to examine the data collected as a result of this project, to review systematically all aspects of the current program, to discuss some recommendations that we have for changes, and to make additional suggestions.

Dissemination of Project Results

Two ERIC papers have resulted from this project.[61,62] Two presentations on aspects of the project were made in Dallas during the American Library Association annual meeting in June 1979 by Evelyn Daniel. One of these was to a group of practicing media specialists at a pre-conference on action research. The other was a part of the Library Research Round Table invited research suite presentations.

Throughout the duration of the project we have carried on an extensive correspondence and many telephone conversations with faculty, practitioners and researchers around the country interested in our activities. We have promised to distribute a number of copies of this final report. We will highlight and comment on aspects of this report in an Information Analysis Paper for ERIC which should receive wide distribution. We will also be submitting a summary article to one of the library journals.

Research Agenda

Midway through the project we submitted a continuation proposal to the Office of Education as it had become clear that we were dealing with a much larger project than could be completed in a year. This proposal was not funded, apparently due to lack of sufficient research funds rather than disapproval of or disinterest in the proposal. We will be seeking other funding in order to test, refine, and extend the model presented here.

Specifically, our research agenda is as follows:

Testing of Cost-Effectiveness Model. Three areas are targeted for a rigorous data collection effort. They are as follows:

1. As practical, hands-on activities are essential to a reliable, competency-based program, field work assessment becomes the most important area and will be our highest priority on the research agenda.

2. A more careful and complete data collection effort relating to course assessment will be undertaken. It will be extended to include effectiveness data as well.

3. An alternative to course and field work assessment is the independent assessment center approach using sets of tests, experiential situations and simulations. This will be the third priority in testing and will require the development of materials and process.

Development of Simulation Assessment Alternative. A goal is to create a dynamic computer-interactive simulation for which all component parameters can be set at different values to simulate different real world situations which the student can then experiment with through different combinations of programs and services in a feedforward/feedback planning and control cycle. This simulation would be cost tested in an independent assessment center mode perhaps with other external assessment measures.

Elaboration of Cost-Effectiveness Model. Several specific areas are in need of elaboration. They are listed below:

1. The specific procedures for collecting and calculating cost data need greater specification. Especially needed are techniques for estimating average time and usage estimates, translating traditional budgets to function and resource categories, and deriving program specific costs.

2. The relationship of the effectiveness model to test validation procedures needs to be thoroughly explored. Validation procedures for non-pencil-and-paper tests need to be identified and/or developed.

3. The implied correlations between strategies and degree of effectiveness in assessing competence must be experimentally validated.

Relationship between Competency-Based School Media Program and the Total Library School. A continued examination of the stresses and complementarities that develop between an articulated but not separate program that exists within a larger program that often holds quite different goals and objectives will be an important spillover as the research goes forward.

This completes the final report of the Competency-Based Assessment Project. As they say at commencement ceremonies, "The end is the beginning!"

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APPENDIX A

COMPETENCIES FOR THE SCHOOL MEDIA SPECIALIST

Syracuse University
1977

COMPETENCIES FOR THE

SCHOOL MEDIA SPECIALIST

Agreed to on May 5, 1977 by the

CONSORTIUM FOR DEVELOPING A COMPETENCY-BASED
EDUCATION PROGRAM FOR MEDIA SPECIALIST

Dr. Evelyn Daniel
School of Information Studies

Dr. Donald P. Ely
Area of Instructional
Technology
School of Education

Syracuse University

ADMINISTRATION FUNCTION. *Administration is the ability to develop and implement media programs which facilitate the achievement of educational goals, including the process of management of the media and human resources. It includes organization management and personnel management.*

1. Establishes goals of the media program.
2. Develops and maintains a long-range plan.
3. Prepares and administers a fiscal plan based on operational needs.
4. Seeks information regarding local, state, and federal policies, standards, legislation, regulations, additional funding sources and certification.
5. Organizes services to achieve goals.
6. Plans media facilities; allocates and monitors space according to program needs.
7. Assesses the degree to which the operations meet the program goals.
8. Writes job descriptions.
9. Recruits, hires, and terminates personnel.
10. Conducts training for staff.
11. Assigns job responsibilities to specific personnel.
12. Supervises personnel.
13. Maintains job satisfaction of personnel.
14. Evaluates employee performance.

DESIGN AND INSTRUCTION FUNCTION. *Design refers to activities which are performed to create an instructional system whether it be a single class, a unit, or a complete course of study. Instruction refers to the formal presentation of knowledge and/or information to others. This is considered to be perhaps the most important function.*

15. Gathers and analyzes user needs information.
16. Analyzes learner characteristics.
17. Analyzes curriculum in all subject areas.
18. Elicits and clarifies objectives of the teacher and/or learner.
19. Assists in determining teaching/learning strategies and techniques.
20. Considers alternative media formats and recommends most appropriate medium.
21. Recommends alternative learning environments.
22. Evaluates and modifies teaching/learning designs.
23. Conducts in-service media training for teachers.
24. Develops learning programs to assist individuals in using media center materials and equipment.
25. Teaches skills in the retrieval and utilization of information to students and teachers.
26. Provides guidance in reading, listening, and viewing experiences for students and teachers.
27. Provides guidance in the use of reference materials.
28. Provides programs to motivate students to read.

SELECTION OF MEDIA FUNCTION. *The selection of media is the ability to apply basic principles of evaluating and selecting media to support the instructional program.*

29. Develops and implements criteria for evaluating and selecting a variety of materials and equipment.
30. Builds a collection of bibliographic aids and tools and other sources to provide current reviews and information about materials and equipment.
31. Establishes and administers processes and procedures for preview, evaluation, selection, and acquisition of materials and equipment.
32. Provides teaching and learning resourses to support teacher and student objectives.
33. Develops selection policies which meet curricular, informational, and recreational needs and which conform to the appropriate legal requirements.

INFORMATION RETRIEVAL AND LOGISTICS FUNCTION. *Information retrieval refers to the systematic organization of materials for future retrieval. Logistics includes all the support and supply processes necessary to acquire materials, to store them, and to set up systems for circulation, inspection, and maintenance.*

34. Determines classification systems to be used for organizing materials.
35. Determines and implements policies relating Classification to storage and retrieval mechanisms.
36. Establishes and evaluates procedures for classifying and cataloging materials and implements them.
37. Determines policies for cataloging of materials.

38. Organizes and maintains accurate and current retrieval mechanisms such as the card catalog and/or book catalog.
39. Organizes and maintains accurate and current accession and inventory records of materials as appropriate.
40. Assesses and implements automated retrieval systems as appropriate.
41. Develops indexes and thesauri for organizing special collections.
42. Compiles and organizes orders for materials and equipment; determines most appropriate source after specific materials or equipment have been identified for purchase or rental.
43. Determines replacement of materials and equipment.
44. Receives and prepares materials for storage and circulation.
45. Determines the most appropriate storage arrangements for all materials.
46. Circulates media and equipment.
47. Conducts inspection of materials and equipment; arranges for maintenance and repair.

PRODUCTION OF MEDIA FUNCTION.*The production of media is the ability to plan, design, and produce materials to supplement those available through other channels.*

48. Operates production equipment.
49. Evaluates, develops criteria, selects production equipment and supplies
50. Develops and applies criteria when deciding whether to produce media locally or to buy commercially available media.
51. Produces media for specialized learning objectives utilizing the basic principles of design.
52. Designs production facilities and establishes basic policies for the operation of these facilities.
53. Instructs and supervises others in the media design and production.

EVALUATION AND RESEARCH FUNCTION.*Research and evaluation are the ability to interpret and apply recorded research and evaluative data applicable to media programs, and to design and implement studies relative to the media center program when there is an identified need.*

54. Determines the need for conducting research activities to support the goals of the media program.
55. Reviews the literature.
56. Designs and adapts research studies for the development and advancement of the media program.
57. Collects, processes, and analyzes data.
58. Assesses results of research.
59. Disseminates information about research.
60. Develops a plan of assessment and evaluation of the media program based on stated objectives according to recognized, acceptable standards

COMMUNICATION AND LEADERSHIP FUNCTION. *Communication defines the highly important responsibility of the media specialist to articulate the goals and objectives of the media program. Leadership is the ability to conceive, synthesize, promote and direct media programs reflecting a commitment to professional ethics.*

61. Plans and implements a public relations program.
62. Provides information about media program to administrators and school board.
63. Communicates with producers and publishers regarding materials and equipment.
64. Establishes regular communication channels between media center personnel and users.
65. Participates as a team member to effect the integration of disciplines.
66. Engages in self-evaluation to identify the areas of need for continuing education and professional growth.
67. Participates in district, county, regional, state, and national organizations.
68. Participates in the development of overall school programs and policies and in the solution of total school problems.
69. Communicates effectively in both written and oral form.
70. Interprets a professional code of ethics to show relationship to a high level of professional conduct.

For more information contact:

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(315) 423-2911

APPENDIX B

EXAMPLES OF COMPETENCY ASSESSMENT TECHNIQUES

COMPETENCY STATEMENT: Establishes goals of the media program.

COMPETENCY NUMBER: 01

EXPLICATION: The director of the media program is responsible for establishing and implementing the goals of the program. These should be an integral part of the goals and objectives of the larger school or school system of which it is a part. To carry out this responsibility requires a definition of the center's users and an analysis of their information needs.

COMPETENCY AREA: Administration

ASSESSMENT LEVEL: 2

ASSESSMENT STRATEGY: Paper/project

CONDITION: Regular course (IST 616)

CRITERIA: Rational standards that are reasonable in terms of the particular situation.

INDICATORS: Expert review

ACTIVITIES: Development of an action plan for a school media center

SOURCE: Evelyn Daniel

ACCESS TERMS: ASSESSMENT STRATEGY - PAPER/PROJECT
LEVEL OF ASSESSMENT - TWO
CONDITION - REGULAR COURSE

COMPETENCY STATEMENT: Uses instructional techniques, methods, and media related to the objectives.

COMPETENCY NUMBER: 19B

EXPLICATION: Given a wide range of differences among learners, there are a variety of ways in which each student may be reached. The media professional must possess a repertoire of strategies and techniques that can be employed by teachers and learners to achieve the stated objectives.

COMPETENCY AREA: Design & Instruction

LEVEL OF ASSESSMENT: 3

ASSESSMENT STRATEGY: Field observation

CONDITIONS: Internship/Fieldwork

CRITERIA: a. Average rating of 3 on a 5 point scale (this was inferred)

INDICATORS: a. Average of the ratings of the data collector, an administrator, and a master teacher

b. Average of students' perceptions

ACTIVITIES: Field observation

Source: Georgia manual, p. 1

Access terms: ASSESSMENT STRATEGY - FIELD OBSERVATION
CONDITION - INTERNSHIP/ FIELDWORK
LEVEL OF ASSESSMENT - THREE

COMPETENCY STATEMENT: The candidate will demonstrate the ability to build a collection of bibliographic aids and tools and other sources to provide current reviews and information about materials and equipment.

COMPETENCY NUMBER: 30

EXPLICATION: One of the first obligations of the media professional is to acquire an adequate collection of selection tools, since they are essential if the task is to be performed effectively. This collection should be kept as comprehensive as needed and as current as possible.

COMPETENCY AREA: Selection of media

LEVEL OF ASSESSMENT: 2

ASSESSMENT STRATEGY: Paper/project

CONDITIONS: Regular course, Independent study, Internship/Fieldwork (this was inferred)

CRITERIA: Average of the subjective judgements of a practitioner, a professor, and a teacher

INDICATORS: Comparison to a standard list and evaluation of reasons for deviation from that list.

ACTIVITIES: Preparation of a bibliography

Source: AASL, p. 17

Access terms: ASSESSMENT STRATEGY - PAPER/PROJECT
CONDITION - INDEPENDENT STUDY
CONDITION - INTERNSHIP/FIELDWORK
CONDITION - REGULAR COURSE
LEVEL OF ASSESSMENT - TWO

APPENDIX B

COMPETENCY STATEMENT: Ability to catalog for small libraries using AACR.

COMPETENCY NUMBER: 36E

EXPLICATION: This competency includes the ability to assign-entry, and to describe monographs, serials, and media.

COMPETENCY AREA: Information retrieval and logistics

LEVEL OF ASSESSMENT: 1

ASSESSMENT STRATEGY: Written test

CONDITIONS: Regular course

CRITERIA:

INDICATORS: Instructor evaluation (this was inferred), self-evaluation, and student-faculty consultation.

ACTIVITIES: Written test

Source: Maryland program, p. 63

Access terms: ASSESSMENT STRATEGY - WRITTEN TEST
CONDITION - REGULAR COURSE
LEVEL OF ASSESSMENT - ONE

COMPETENCY STATEMENT: Operate AV equipment in the library media center and instruct students in its proper use.

COMPETENCY NUMBER: 48C

EXPLICATION: This includes the ability to operate basic pieces of audiovisual equipment by successfully threading or loading the equipment, manipulating the controls, trouble-shooting, and repacking identified audiovisual equipment.

COMPETENCY AREA: Production of Media

ASSESSMENT LEVEL: 3

ASSESSMENT STRATEGY: Field Experience

CONDITION: Internship/fieldwork

CRITERIA: Satisfactory demonstration of professional competence, based on a seven point scale

INDICATORS: Evaluations made by the media specialist supervisor and the faculty field supervisor

ACTIVITIES: Fieldwork in a library media center, including the production of a set of materials to be left for use in the library media center

SOURCE: IST 970 policy guidelines

ACCESS TERMS: ASSESSMENT STRATEGY - FIELD EXPERIENCE
CONDITION - INTERNSHIP/FIELDWORK
LEVELS OF ASSESSMENT - THREE

APPENDIX B

COMPETENCY STATEMENT: Reviews the literature.

COMPETENCY NUMBER: 55

EXPLICATION: A product of research is a body of recorded and documented knowledge. To locate this information the media professional has to comb the literature of the field and related areas. The researcher should read the literature and, considering his/her own experience, draw both synthesizing and question-raising conclusions.

COMPETENCY AREA: Evaluation and Research

LEVEL OF ASSESSMENT: 1

ASSESSMENT STRATEGY: Written test

CONDITIONS: Regular course, Independent study (this was inferred)

CRITERIA:

INDICATORS: Comparison to a list of sample answers

ACTIVITIES: Written test

Source: Chisholm & Ely, p. 333

Access terms: ASSESSMENT STRATEGY - WRITTEN TEST
CONDITION - INDEPENDENT STUDY
CONDITION - REGULAR COURSE
LEVEL OF ASSESSMENT - ONE

APPENDIX B

COMPETENCY STATEMENT: Communicates with learners both orally and in writing.

COMPETENCY NUMBER: 69A

EXPLICATION: This includes an awareness of the literature of this and related fields, and a basic understanding of relevant administrative and organizational issues and the development and evaluation of information/media services in school settings.

COMPETENCY AREA: Communication and Leadership

LEVEL OF ASSESSMENT: 3

ASSESSMENT STRATEGY: Field experience

CONDITIONS: Internship/fieldwork

CRITERIA: A. Average rating of 3 on a 5 point scale (this was inferred)

INDICATORS: A. Average of the ratings of the data collector, an administrator, and a master teacher
B. Average of students' perceptions

ACTIVITIES: Field experience

SOURCE: Georgia manual, p. 1

ACCESS TERMS: ASSESSMENT STRATEGY - FIELD EXPERIENCE
CONDITION - INTERNSHIP/FIELDWORK
LEVEL OF ASSESSMENT - THREE

APPENDIX C

INTERVIEW PROTOCOL A FOR DETERMINATION OF FACULTY ASSESSMENT ACTIVITIES

APPENDIX C

INTERVIEW PROTOCOL A

Data Related to the CEE Research on Assessment Strategies for Library/Media Professionals

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Gaining the Interview:

Hello, this is _____. I'm working with Evelyn Daniel and Don Ely on a research project related to the development of alternative strategies for assessing library/media competencies.

We sent you a memorandum in August listing those competencies you had earlier said your course allowed students to demonstrate. This time we want some information about which of those competencies were in fact demonstrated and which were satisfactory.

I would appreciate an interview to this effect between now and the Christmas break. Can you offer a suggested time when we can meet?

(Consult the calendar)

Thank you _____ for your cooperation and I'll see you in your office at _____ on the _____ of _____.

Interview # _____

Interview Protocol A p.2

DEMOGRAPHICS:

Faculty Member _____ IST ___ AIT ___

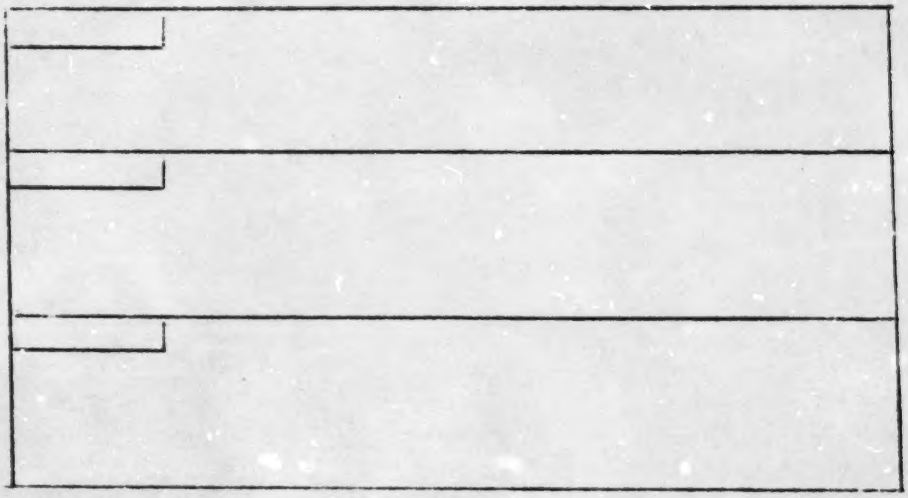
Interviewer _____

Date

(Distribute these handouts: List of competencies, Description of Media Professionals, and the August Memorandum)

1. I would like to begin by reviewing your courses and the competencies relating to them.

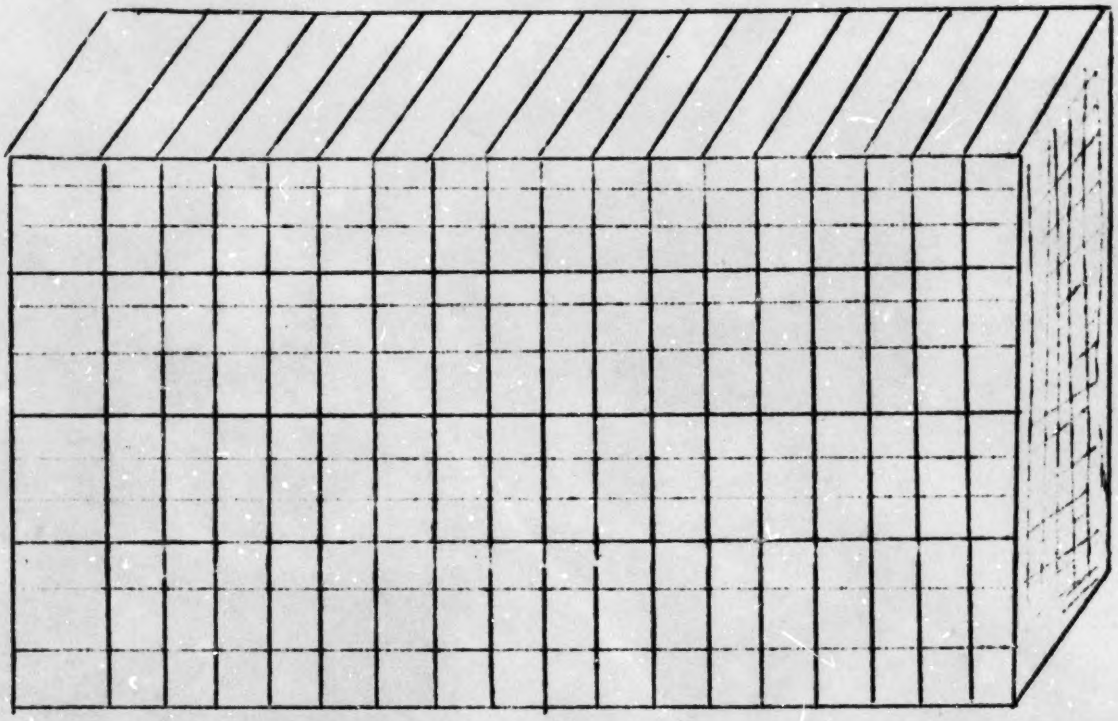
2. What activities and assignments do you use to achieve your course objectives?



Interview Protocol A P. 3

3. Do you have any examples of the activities and assignments that I could see? YES ___ NO ___
(Inquire about purpose, success, importance and the like. Enter comments below.)

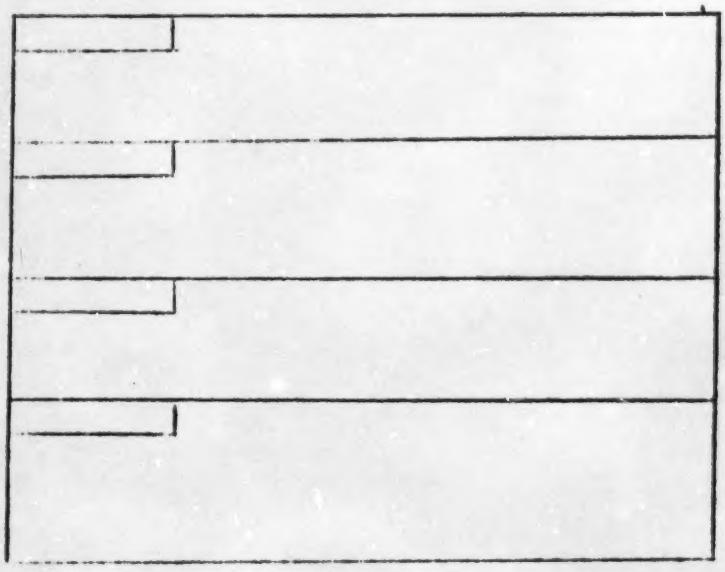
4. In your response to the August memorandum you indicated that your courses train for the following competencies. Do you feel that courses continue to address these competencies? (Cross out those which the professor feels s/he no longer addresses.)



I would like to inquire about the assessment procedures you use to test the students skill in each of these competencies. Can we start with the first one and work down the list? (Return to the box above and work your way throuch it)

Interview Protocol A P.4

5. What are some current assessment techniques which you use in your classes?



6. Are there any comments or suggestions which you would like to make that would be helpful to us?

(Conclude the Interview)

APPENDIX D

INTERVIEW PROTOCOL FOR ESTIMATES OF FACULTY ASSESSMENT COSTS

APPENDIX D

Introduction

The following interview relates to research on "Developing Alternative Strategies for Evaluating Competencies of Library/Media Personnel in Competency-Based Programs." For this research we need to gather data on "time spent" in assessment activities. This questionnaire will help us to gather the "time spent" data.

The interview is divided into two parts: The Setting and The Questions. The Setting presents the framework in which you are asked to respond to the questions. The Questions ask about (1) time spent on assessment activities in your course(s) and (2) other costs related to student assessment.

APPENDIX D

I. The Setting

A. As an instructor you spend a quantity of your time assessing students. You use various strategies for doing this.

1. In an earlier interview you indicated that you use the following assessment strategies.

_____

_____

_____

_____

2. Other strategies are:

_____

_____

_____

_____

B. Each of these strategies in some way tests the student's ability in your course. Because of this, each strategy may be called a test. Testing students requires the instructor to perform certain activities.

*Test Development and Construction
*Test Administration
*Test Analysis
*Test Recording and Reporting
*Test Related Advisement

The assessment of students involves each of these activities. In order to obtain an estimate of time spent in assessment, it is necessary to consider the amount of time spent in each of these activities.

There is another kind of assessment which not listed above. This form of assessment is referred to as "professional judgment in non-formal settings." That is, the instructor may assess students through discussions, tutorials, or other classroom activities which do not fall under the assessment strategies listed above.

APPENDIX D

Time estimates relating to professional judgment in non-formal settings are difficult to make, particularly where this kind of assessment constitutes only a minor part of one's assessment program. However, when this kind of assessment plays a major role in one's assessment program, time analysis is necessary, despite its difficulty, in order to gain a perspective of "time spent" on assessment activities.

Please Note! The instructor is asked to exclude from consideration activities relating to Test Development and Construction. The project is attempting to estimate operating costs and not development costs, so we will omit these from consideration.

Please Note! If it helps to use an additive estimate, consider how much time you have spent in each of the following.

*Test Administration
*Test Analysis
*Test Recording and Reporting
*Test Related Advisement

Add these estimates together for "total" time.

APPENDIX D

II. The Questions

A. Time:

1a. How much time to date have you spent on assessment activities for this course(e.e.,_____) _____Hours

1b. How accurate do you think your estimate is? (circle one)

*Accurate *In the Ballpark *Wild Guess

2a. How much more time will you spend on assessment activities in this course?

_____Hours

2b. How accurate do you think your estimate is? (circle one)

*Accurate *In the Ballpark *Wild Guess

You indicated that you assessed the competencies highlighted on the enclosed forms _____ through _____. Examine these forms before answering the next question.

3. How much of your total assessment time do you estimate was spent in assessing these competencies? (Please use a percent [%]) _____%

B. Other Costs:

1. Estimate, if you can, the cost of the materials used during the assessment activities. (Disregard this if you feel the amount is insignificant) _____Dollars

2. What other costs associated with your assessment activities do you feel need to be considered? (Assign dollar values to these where appropriate: e.g., travel)

* _____ $_____

* _____ $_____

* _____ $_____

* _____ $_____